Prescription drug misuse and sexual risk behaviors among young men who have sex with men (YMSM) in Philadelphia

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Abstract

Background: Prescription drug (i.e. opioids, tranquilizers, or stimulants) misuse has emerged as a significant public health problem among young adults. Limited research has examined this problem among young men who have sex with men (YMSM), including its link to sexual risk behaviors. This is of concern as YMSM are at elevated risk for both substance use and HIV infection.

Methods: The current study used mixed-methods design to assess the relationship between prescription drug misuse and sexual risk behavior, to identify the risk factors influencing prescription drug misuse and risky sexual behavior among YMSM, and to explore motivations and social contexts of prescription drug misuse in a sample of 191 YMSM (aged 18-29), current misusers of prescription drugs, recruited in Philadelphia from November, 2012 to July, 2013.

Results: Findings from the first quantitative analysis suggested that some prescription drugs are associated with sexual risk behaviors among YMSM. Those included opioids, muscle relaxants, and over-the-counter (OTC) medications. Findings from the second quantitative analysis identified some of the risk factors associated with increased prescription drug misuse. For example, experiences of childhood abuse were associated with increased prescription opioid and tranquilizer misuse, while experiencing recent stress was associated with increased opioid misuse. Recent experiences of somatization were associated with illicit drug use. Additional analyses indicated that illicit drug use, but not prescription drugs, significantly mediate the impact of stressors on sexual risk behaviors. Findings from qualitative analysis yielded some distinct motivations for prescription drug misuse. These

included social/recreational motives, facilitating sex with other men, and psychological motives.

Conclusions: We observed complex associations between prescription drug misuse and sexual risk behaviors. Assessing the individual, social, and environmental factors affecting YMSM may help in developing more efficacious prevention programs for substance use and sexual risk behaviors.

Chapter 1. Introduction

Background & Significance

Prescription drug misuse is defined as the use of a medication without a prescription, in a way other than as prescribed, or for the experience or feelings elicited (Barrett, Meisner, & Stewart, 2008; National Institute on Drug Abuse, NIDA, 2011). Prescription drug misuse has emerged as a significant public health problem due to a number of harmful economic, societal, and personal outcomes (Hernandez, & Nelson, 2010; Gilson, & Kreis, 2009). Between 1993 and 2005, we have seen a drastic increase in the non-medical use of prescription painkillers (343%), tranquilizers (450%), and stimulants (93%), among the US population (Substance Abuse and Mental Health Services Administration, SAMHSA, 2010). Between 2005 and 2011, in United States (U.S.), 15.7 million persons aged 12 or older (6.3 %) used prescription-type drugs non-medically in the past year, and 6.7 million (2.7 %) did so in the past month (SAMHSA, 2012). Overall, 4.8 % of persons aged 12 or older reported past year nonmedical use of pain relievers, 2.1 % reported nonmedical use of tranquilizers, and 1.2 % reported nonmedical use of stimulants (SAMHSA, 2012). After marijuana, nonmedical use of prescription drugs ranks as the second most common class of illicit drug use in the U.S. (SAMHSA, 2012).

Prescription drug misuse accounts for a rapidly increasing share of substance abuse among youth and young adults as well. 12.6% of adolescents between ages of 12 and 17 years and 31.4% of young adults (aged 18-29) reported prescription drug misuse at some point in their lifetime (SAMHSA, 2010). Between 2005 and 2011, 8.5% of adolescents between ages of 12 and 17 years and 15% of young adults (aged 18-26) reported prescription drug misuse in the past year (SAMHSA, 2012). Initiation rates for prescription drug misuse

continue to be second only to marijuana rates, while sustained numbers of new and continuing misusers have contributed to substantial increases in indicators of problems associated with misuse among young adults (SAMHSA, 2011). While the recent data indicate that the rate of use declined slightly between 2010 and 2011 (SAMHSA, 2012), with an annual average of 15.7 million people aged 12 or older having misused prescription drugs between 2005 and 2011, additional prevention efforts are needed (SAMHSA, 2012).

Data on prescription drug misuse in Pennsylvania and Philadelphia is limited, yet the consequences of prescription drug misuse are evident. The diversion and abuse of controlled prescription drugs pose significant and growing threats to the Philadelphia region, including a rise in the number of violent and property crimes associated with the drugs. In 2009, there were more than 75 pharmacy robberies and burglaries in the region that resulted in the theft of large quantities of controlled prescription drugs (especially OxyContin and Percocet); in 2010, that number increased to more than 100 (U.S. Department of Justice, 2011). According to Federal Bureau of Investigation (FBI), robberies and burglaries of Philadelphia area pharmacies in 2010 resulted in the theft of prescription opioids valued at several million dollars (US DOJ, 2011). Furthermore, the abuse of heroin and controlled prescription drugs resulted in increased treatment admissions and overdoses. The number of drug overdose deaths, a majority of which are from prescription drugs, increased by 89% since 1999 (Levi, Segal, Fuchs-Miller, et al., 2013). In 2010, in Pennsylvania, 18-30 years old held the highest rate of treatment admissions in comparison to other age categories (68% for hallucinogens, 62% for opioids, 53% for stimulants, 49% for tranquilizers, and 48% for sedatives) (SAMHSA, 2010). Treatment admissions for misuse of oxycodone in Philadelphia increased from 10 clients in 2007 to 410 in the first half of 2010 (DHHS, 2010). While the use of ben-

zodiazepines in Philadelphia was lower than use of marijuana, alcohol, cocaine, or heroin, it continued to be common in conjunction with other drugs (Cutler, 2011). In the first half of 2010, oxycodone was the fourth most frequently detected drug, behind cocaine, heroin, and alprazolam in drug-induced deaths, while alprazolam was the most widely used benzodiazepine, ranking third in the medical examiner toxicology report (Cutler, 2011).

Current data indicate a clear pattern of increased prescription drug misuse across various segments of society. Prescription drug misuse has been researched extensively in heterosexual college population (McCabe, West, & Wechsler, 2007; Arria, Caldeira, O'Grady, et al., 2008), adolescents (Rigg, & Ford, 2014), or high-risk young adults (Lankenau, Schrager, Jackson, et al., 2012; Lankenau, Teti, Silva, et al., 2012), yet little research has examined prescription drug misuse among men who have sex with men (MSM). Using a community-based sample of MSM, Kelly, & Parsons (2010), reported the high prevalence of lifetime (49.2%) and recent (33.6%) prescription drug misuse. Benotsch, et al. (2011) reported findings from a sample of MSM attending a gay pride festival in which 38% reported lifetime, while 17% reported misuse in the previous three months. No study up to date has focused on prescription drug misuse among young MSM (YMSM). This is despite evidence showing that YMSM are more likely to initiate drug use at an earlier age and to experience high rates of tobacco, alcohol and illegal substance use (Stall, & Willey, 1998; Mansergh, Colfax, Marks, et al., 2001; Benotsch, Kalichman, & Cage, 2002; Thiede, et al., 2003; Kalichman, et al., 2004; Purcell, et al., 2005; Marshal, Friedman, Stall, et al., 2008). In a number of these studies, YMSM (ages 18-29) are more likely than older MSM to engage in heavier tobacco, alcohol and drug use (Stall, Paul, Greenwood, et al., 2001; Greenwood, White, Page-Shafer, et al., 2001; Salomon, Mimiaga, Husnik, et al., 2009). Substance use is

of concern in this population considering the increased risk for drug dependence and other serious health and social consequences (e.g., HIV infection) (Kandel, Yamaguchi, & Chen, 1992; Clark, Kirisci, & Tatar, 1998; Benotsch, Koester, Luckman, et al., 2011).

Previous research has documented the relationship between substance use and heightened sexual risk behaviors (typically defined as not using condoms and/or having multiple sexual partners) in samples of YMSM (Celentano et al., 2006; Mustanski, 2008; Mutchler et al., 2011). There is strong evidence pointing to a link between club drug use and increases in HIV and sexually transmitted infections (STI) prevalence, particularly in YMSM population (Garofalo, et al., 2007; Grov, Kelly, & Parsons, 2009). Given this intersection of drug use with risky sexual behaviors (Kipke, Weiss, Ramirez, et al., 2007), it is likely that prescription drug misuse may pose an additional burden on YMSM. Prescription drugs, such as painkillers, depressants, and stimulants, can possibly lead to young individual's inability to weigh risks and benefits when making decisions, especially when it comes to safe sexual practices. These drugs may alter judgment and inhibition and lead young adult to engage in impulsive and unsafe behaviors.

This is of concern as gay and bisexual men, and in particular YMSM, continue to be the risk group most severely affected by HIV in the U.S (Center for Disease Control, CDC, 2010). A number of studies have demonstrated that YMSM have higher rates of HIV infection (CDC, 2010; Hall, et al., 2008). From 2006-2009, there was a 21% increase in incidence of HIV among 13-29 year olds, mainly driven by 34% increase in YMSM (Prejean, et al., 2008). YMSM are at risk in Philadelphia as well. In 2010, 35% of all new HIV cases were ages 13-29, whereas 43% of newly-diagnosed were MSM (Philadelphia Department of Health, 2010). In another study of urban MSM, Philadelphia’s HIV prevalence was 11%,

while 77% of those who were positive were not aware of it (CDC, 2008). YMSM are vulnerable to HIV and sexually transmitted diseases (STDs) for many reasons, including high levels of drug and alcohol abuse (Royce, et al., 1997; Halkitis, Parsons, & Wilton, 2003). HIV prevalence, incidence, and risk behaviors are higher among MSM-drug users than other male drug users and non-MSM-drug users (Catania, et al., 2001). Particularly vulnerable are YMSM drug users, because of inexperience in practicing safe sex and safer drug use (Thiede, et al., 2003). Given these evidence it is reasonable to hypothesize associations between prescription drug misuse and risky sexual behavior. However, little research has addressed this issue. One study examined associations of prescription drug misuse and risky sexual behavior in general population of MSM, finding that those who reported recent prescription drug misuse were more likely to engage in unprotected anal intercourse (UAI) (Kelly, & Parsons, 2011).

One key to understanding a behavior is to examine the causes, reasons, or intentions that move individuals to perform certain actions, including substance use (DiClemente, Bellino, & Neavins, 1999). To develop appropriate prevention strategies, researchers need to understand different populations of prescription drug misusers (Zacny, et al., 2003), including their motivations for misuse. Motivations for prescription drug misuse vary and may include self-treatment of pain, help with concentrating, recreational use, etc. (Boyd, et al., 2006; McCabe, Boyd, & Teter, 2009). However, available research does not provide strong direction in hypothesizing motives for prescription drug misuse that might resonate with YMSM. In addition to above-mentioned motivations, it is possible that prescription drug misuse and substance use for this population might be more purposeful. YMSM may use drugs to cope with emotional challenges of coming out or engaging in same sex

relationships, or self-medication of negative affect associated with HIV status (Stueve, et al., 2002; Celentano, et al., 2006). While there is a significant amount of research documenting the use of club and illicit drugs for enhancing sexual experiences (Semple, Patterson, & Grant, 2002; Halkitis, Fischgrund, & Parsons, 2005), no research has examined whether motivations for prescription drug misuse may be related to sexual behaviors of YMSM.

Key determinants of the problem

The social environment plays an important role in the health of YMSM individuals. Although they come from many different socio-economic backgrounds, YMSM share similar experiences related to stigma, prejudice, discrimination, violence, etc. Studies have shown that many YMSM report numerous risk factors such as harassment and discrimination (Mays, & Cochran, 2001; Huebner, Rebchook, & Kegles, 2004; Wong, Weiss, Ayala, & Kipke, 2010), exposure to violence, physical and sexual abuse growing up (Kalichman, et al., 2004; Doll, Joy, Bartholow, et al., 1992; Welles, Baker, Miner, et al., 2009), mental health problems (Kipke, et al., 2007), homelessness (Lankenau, Clatts, Welle, et al., 2005; Clatts, Goldsamt, Yi, & Gwadz, 2005; Salomonsen-Sautel, Van Leeuwen, Gilroy, et al., 2008), and lack of social support (Ryan, Huebner, Diaz, & Sanchez, 2008). Evidence suggests that exposure to harassment, discrimination, and abuse predicted mental health problems such as depression, lower self-esteem and even increased suicidal ideation (Huebner, et al., 2004; Friedman, Marshal, Stall, & 2008), and later health problems, including HIV infection (Brennan, Hellerstedt, Ross, & Welles, 2007). Although YMSM use drugs for many of the same reasons as their heterosexual counterparts, researchers believe that many of the above risk factors contribute to increased substance abuse among YMSM (Meyer, 2003; D'Augelli, & Herschberger, 1993; Kalichman, Benotsch, Rompa, et al.,

2001). Greater rates of substance use among YMSM are often linked to minority-specific stressors, which are rooted in societal heterosexism (Meyer, 1995; Meyer, 2003). In a process of coming out, YMSM may seek out and begin to spend time in urban gay-identified venues (bars, clubs) and cultures (circuit parties), where they may find acceptance, but also norms that support use of alcohol and drugs (McKirnan, Ostrow, & Hope, 1996; Thiede et al., 2003). A body of literature supports that perceptions of social norms predict drug use and risky sexual behavior (Liu, & Iwamoto, 2007; Peterson, & Bakeman, 2006; Hamilton, & Mahalik, 2009). YMSM are more likely to engage in health risk behaviors because they experience pressures during socialization, which encourages health risk behaviors. These minority stress factors and social norms pressures could also be motivating factors for prescription drug misuse among YMSM.

Purpose of Study

Given the well-established intersection of illicit drug use and risky sexual behaviors, the purpose of this study is to examine the relationship between prescription drug misuse and risky sexual behavior. Significant gaps exist in our understanding how risk factors (racism, homophobia, internalized homophobia, traumatic life experiences, and mental health distress) relate to problematic patterns of prescription drug misuse, and whether they moderate relationship of prescription drug misuse and risky sexual behaviors. The objective of this study is to contribute to our understanding whether these factors influence prescription drug misuse and risky sexual behaviors among YMSM. Furthermore, of interest is to learn whether motivations for misuse of prescription drugs are related to sexual behaviors of YMSM. Gaining a better understanding of the nuances of the prescription drug misuse,

including whether these drugs are used in the context of sexual risk behaviors, will enable more direct health promotion efforts.

Specific Aims

In brief, the study investigated the central hypothesis of a deleterious relationship between prescription drug misuse and sexual health of YMSM. The study utilized quantitative and qualitative research methodologies and applied theories from the fields of substance misuse and YMSM health to advance in-depth understanding of the problem. The study had three aims:

Aim 1: To determine patterns of prescription drug misuse and sexual risk behavior among YMSM in Philadelphia. Research Question (RQ) 1: What are the types and forms of prescription and illicit drugs used by YMSM?; RQ 2: What is relationship between prescription drug misuse and risky sexual practices (i.e. unprotected anal sex and high number of sex partners)?

Aim 2: To determine the risk factors contributing to prescription drug misuse and sexual risk behaviors among YMSM. Working hypothesis (WH): Consistent with the Minority Stress Model (Meyer, 2003) and Problem Behavior Theory (Jessor, & Jessor, 1977), I hypothesize that YMSM who report negative experiences, such as stress, discrimination, and/or traumatic life experiences, will have more problematic patterns of prescription drug misuse and exhibit riskier sexual behaviors.

Aim 3: Explore the motivations for prescription drug misuse. RQ 1: What are motivations for prescription drug misuse among YMSM?; RQ 2: Do YMSM misuse prescription drugs in sexual context, including engagement in sexual risk behaviors among YMSM?

Methods

The study was conducted using mixed-methods design. Aims 1 and 2 are addressed through a quantitative analysis of cross-sectional data collected from 191 YMSM aged 18-29 in Philadelphia who misused prescription drugs in the last 6 months. Aim 3 is addressed through a qualitative analysis of prescription drug misuse and risky sexual behavior among a subsample of 25 YMSM.

Field Recruitment

Detailed descriptions of the eligibility criteria, sampling strategy, measures, and analyses are presented in Chapters 2-4. In brief, eligibility criteria included being a male (born male); aged between 18-29 years old; reporting anal (receptive or insertive) or oral (mouth to genitals) sex with a man in the last 6 months; used non-medically at least one prescription drug type (opioids, tranquilizers, stimulants) in past 6 months; ability to speak, read, and understand English (assessed by comprehension of verbal consent); and live in the Philadelphia area (assessed by ZIP code of residence). Sampling was stratified by age (three age ranges: 18-21, 22-25, 26-29). YMSM were recruited using traditional recruitment techniques that are based upon purposive, targeted and chain referral sampling (Muhib, Lin, Stueve, et al., 2001; Watters, & Biernacki, 1989; MacKellar, Valloroy, Karon, et al., 1996). Study recruitment was conducted in Philadelphia between November 2012 and July 2013 at a number of different locations. These included street hangouts and parks in Center City, Washington West Square, Rittenhouse Square, South Philadelphia, Northern Liberties, Kensington, and University City. With permission of the owners of commercial venues (i.e. Tabu, iCandy, Woodys, UBar, Bike Stop, Knock, Adonis, Cafe Twelve) study recruitment was done also on, or near their premises. Using mapping data from the community

assessment process, additional locations were identified and included during the recruitment with both active and passive (i.e. flyers) approaches. These included Philadelphia's LGBT Pride, Philadelphia Fight, Youth Health Empowerment Project (Y-HEP), Attic Youth Center, University of Pennsylvania LGBT Center, Drexel University Main Campus and Center City Campus, William Way LGBT Center, Mazzoni Health Center, Giovanni's Bookstore, The Church of St. Luke and the Epiphany, and Prevention Point Philadelphia. Beginning in May of 2013, advertisements were also placed on craigslist.org under the "Volunteers Needed" section. These advertisements were akin to flyers placed at physical locations, and were introduced as an additional recruitment approach. By using multiple venues for recruitment we attempted to obtain a representative sample of YMSM in Philadelphia.

The recruitment and enrollment of study participants is described in Figure 1. All participants were first screened for eligibility, whether in person, or over the phone. A total of 926 individuals were screened. Of those potential participants, 486 (52.5%) did not report sex with men in the past 6 months. Of the 440 (47.5%) respondents who reported having sex with male partners in the past 6 months, 195 (21.0% of 926) were ineligible, as they did not misuse any prescription drug in the past 6 months. Of 245 YMSM (26.5% of 926) who misused prescription drug(s) in the past 6 months, 10 (1% of 926) were ineligible as they did not reside in Philadelphia, 14 (1.5% of 926) were ineligible due to already filled quota for their age strata. Another 23 (2.5% of 926) of participants screened as eligible, but they were lost to follow up and as such did not complete the informed consent process. Thus, a total of 198 YMSM were eligible for participation and were referred to informed consent. Another 7 (0.8% of 926) participants, although they completed the interview, were disqualified from the study after it was determined that they either had not satisfied

enrollment criteria or had already been interviewed. The final sample consisted of 191 participants (21% of all screened individuals) who completed the quantitative survey. Among

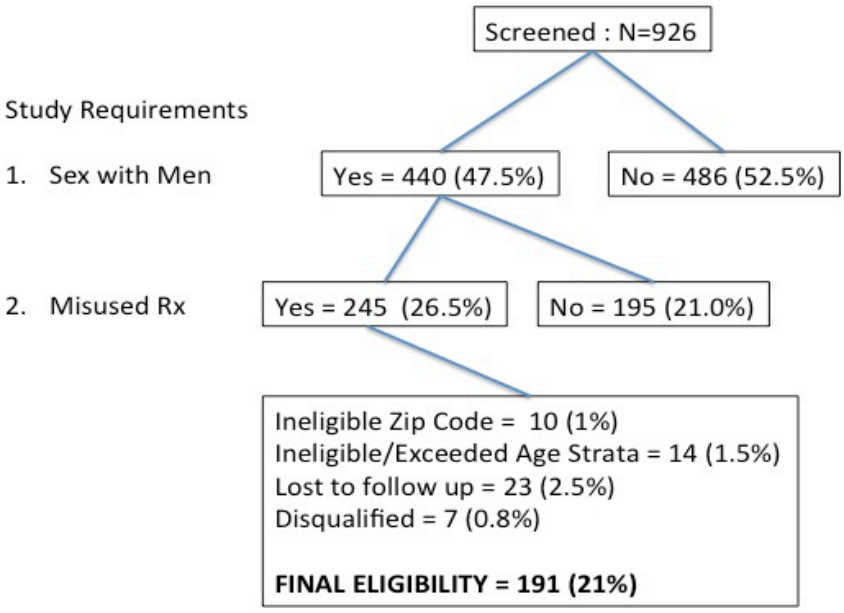

Figure 1. Flow chart of participant recruitment, eligibility, and enrollment

these, 25 participants were selected purposively for the qualitative interview. I interviewed the majority of recruited participants (n=159, 83%) for the quantitative survey, while the research assistant interviewed 32 (17%) participants. I conducted all 25 qualitative surveys.

The map below illustrates the zip codes of residence of study participants. The overwhelming majority of participants resided within City of Philadelphia boundaries (n=172, 90%). Another 13 (7%) participants resided in adjacent Philadelphia's suburbs in Pennsylvania, while 6 (3%) participants indicated New Jersey's suburbs, mainly Camden, as their residence.

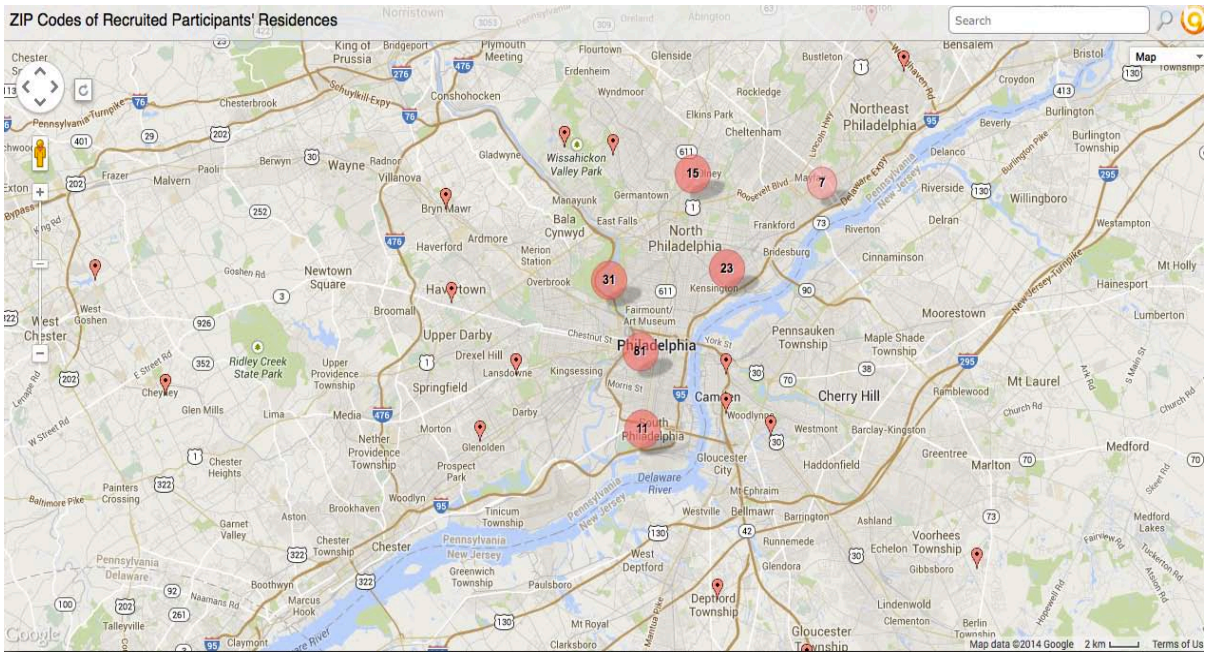

Figure 2. Zip codes of recruited participants' residences. Each marker indicates one participant. Within City of Philadelphia there are multiple zip codes with multiple participants per zip code.

Of 191 participants, 52 (27.2%) were recruited on the streets and in parks across the city; 40 (20.9%) participants called my office after seeing advertisements in the community, or after being given a card during outreach; 35 (18.3%) participants were recruited on the premises of LGBT community based organizations (CBO); 16 (8.5%) participants were recruited in LGBT identified cafes, bars, and/or clubs; 14 (7.3%) participants were recruited on multiple university campuses across Philadelphia; 10 (5.2%) participants were referred by other participants; 9 (4.7%) participants responded to advertisements placed in electronic media; 8 (4.2%) participants were recruited on the premises of Prevention Point Philadelphia, a community based syringe exchange, and finally, 7 (3.7%) participants were recruited at LGBT homeless shelter that was operating at Arch street Presbyterian Church from January to March of 2013.

Aims 1 and 2 – Cross-sectional Quantitative Survey

Detailed descriptions of measures and analyses are presented in Chapters 2 and 3. Briefly, a cross-sectional survey consisted of six modules. The survey assessed prescription drug misuse, illicit drug use, sexual behaviors, risk factors (i.e. childhood abuse, experiences of homophobia, racism, social homophobia/racism, internalized homophobia) mental health and stress, and demographics. The survey consisted of closed-ended questions and standardized scales designed for categorical coding. The assessment was scripted using iSurvey software (Contact Software Ltd, Wellington, New Zealand) and administered on iPads. The survey was pilot tested with 10 YMSM during the formative phases of the community assessment process ensuring that the instrument is an appropriate length, e.g., 50-60 minutes, format, e.g., skip pattern, and results in consistent responses and low rates of missing data. Two analyses resulted from the quantitative survey. First, multiple logistic regression was used to investigate association between prescription drug misuse and UAI, and zero-truncated Poisson regression to investigate association between prescription drug misuse and the number of sex partners. Results of this analysis are presented in Chapter 2. Second, logistic regression models were used to examine the association between stressors and drug use and/or sexual risk behaviors. Following this, the path analysis was used to determine whether the associations between stressors and sexual risk behaviors were moderated by drug use (prescription drug misuse and illicit drug use). Findings are presented in Chapter 3.

Aim 3 – Qualitative Interviews

Detailed descriptions of the sampling strategy, interview guide, and analysis methods are presented in Chapter 4. Briefly, the qualitative interview consisted of approximately one-

hour, in-depth, semi structured interview that was digitally recorded and transcribed in its entirety. Qualitative interviews consisted of four modules exploring substance use, sexual risk behaviors, risk factors for these behaviors, and social context of prescription drug misuse and sexual behaviors. The substance use module explored prescription and illicit drugs use history, initiation, motivations for substance use, patterns of consumption, access, etc. The sexual risk behaviors module probed sexual practices, including substance use associated with sexual practices, condom use, etc. The risk factors model explored key areas of life history, including the "coming out" process, abuse, discrimination, mental distress, and social support. The social context module explored the interplay between patterns of drug use and sexual practices, including social norms surrounding these behaviors. The interview was pilot tested with two YMSM prior to implementation to ensure comprehension, and to allow an opportunity for adjustments prior to implementation. In the analysis, I focused on investigating motivations for prescription drug misuse. I compared narrative data that describes factors and reasons that contribute to prescription drug misuse and risky sexual practices and whether prescription drug misuse is related to sexual behaviors. Findings are presented in Chapter 4.

Chapter 2. Prescription Drug Misuse and Sexual Risk Behaviors in a Sample of Young Men Who Have Sex With Men (YMSM) in Philadelphia

Abstract

Objective: To measure associations of prescription drugs misuse (opioids, tranquilizers, stimulants, and "other" prescription pills) with engagement in sexual risk behaviors (i.e. unprotected sex, and increased number of sex partners) among a sample of young men who have sex with men (YMSM) who misuse prescription drugs in Philadelphia, PA.

Methods: Data come from a cross-sectional study of 18-29 year old YMSM (N=191) who misused prescription drugs in the past 6 months. Unadjusted associations between sexual risk behaviors, socio-demographic, and drug use variables were investigated in two distinct regression models: bivariate logistic models for unprotected anal intercourse (UAI) and zero-truncated Poisson regression model for number of sex partners. Multivariate models identified different prescription drugs associated with sexual risk behaviors.

Results: Of 176 participants engaging in anal intercourse in the past 6 months, 57.6% engaged in UAI. Median number of sex partners was 5, Interquartile Range (IQR): 2,10. After adjusting for socio-demographic variables and illicit drug use, a number of prescription drug classes were either significantly, or marginally associated with UAI. Those included prescription opioids, muscle relaxants, and over-the-counter (OTC) medications. Misuse of prescription tranquilizers before sex was protective to engaging in UAI, and in particular, insertive UAI. No prescription drug class was associated with higher number of sex partners after adjusting for socio-demographic variables and illicit drug use.

Conclusions: This study provides additional evidence that some prescription drugs are associated with sexual risk behaviors among YMSM who misuse prescription drugs. Results could inform practitioners to tailor current HIV prevention efforts.

1. Introduction

Nonmedical use or misuse of prescription drugs is a serious and growing public health problem in United States, particularly among young adults aged 18-25 (Compton, Volkow, 2006; Boyd, Teter, West, Morales, & McCabe, 2009; Substance Abuse and Mental Health Services Administration, SAMHSA, 2010). Nearly one-third of young adults reported having misused prescription drugs at some point in their lifetime (SAMHSA, 2010). This lifetime estimate of prescription drug misuse exceeds rates of use for most other drugs, including cocaine and heroin, among individuals in the same age group (SAMHSA, 2010). Misuse of prescription drugs has been linked to a number of negative health outcomes among young adults, including drug dependence (SAMHSA, 2008; Weiss, et al., 2009; Chen, Storr, & Anthony, 2009), drug overdose (Paulozzi et al, 2012), psychiatric dysfunctions (Schepis & Hakes, 2011), and multiple risk practices (Lankenau, et al., 2012; Aria et al., 2008a). Much of data on prescription drug misuse among young adults is largely limited to the heterosexual college population (McCabe, West, Wechsler, 2007; Aria et al., 2008b), or high risk population (Lankenau, et al., 2012).

While a substantial body of research consistently shows high rates of tobacco, alcohol and illegal substance use in men who have sex with men (MSM) (Stall, & Willey, 1998; Mansergh, et al., 2001; Benotsch, Kalichman, & Cage, 2002; Thiede, et al., 2003; Kalichman, et al., 2004; Purcell, et al., 2005; Marshal et al., 2009) only a few studies have explored prescription drug misuse in this population (Cochran, et al., 2004; Kelly, & Parsons, 2010; Benotsch, et al., 2011). Cochran, et al. (2004) found that men reporting same-sex partners had greater odds of lifetime use of analgesics and tranquilizers, compared to men who did not have same-sex partners. Using a community-based sample of MSM, Kelly and Parsons

(2010), reported the high prevalence of lifetime (49.2%) and recent (33.6%) prescription drug misuse within this population. Benotsch et al. (2011), reported findings from a sample of MSM attending a gay pride festival in which 38% reported lifetime, and 17% reported prescription drug misuse in the previous three months. These estimates are not specific to young MSM (YMSM, ages 18-29), although YMSM are more likely than older MSM to engage in tobacco, alcohol and drug use (Stall, et al., 2001; Greenwood, et al., 2001; Thiede, et al, 2003; Cochran, et al., 2004; Kipke, et al., 2007; Salomon, et al., 2009). A number of studies have documented higher use of marijuana (Celentano, et al., 2006), or "club drugs", i.e. ecstasy, cocaine, crystal methamphetamine (Kipke, et al., 2007; Garofalo, et al., 2007; Grov, Kelly, & Parsons, 2009) among YMSM. One study examined the recreational use of erectile dysfunction drugs (EDD) among YMSM and found it to be uncommon (Kipke et al., 2007).

Young adults are more likely to have sex with multiple partners and to use condoms inconsistently or not at all (Santelli, et al., 1998). They are more likely to get infected with HIV and other sexually transmitted infections (STI) (Centers for Disease Control and Prevention, CDC, 2012). YMSM, in particular, continue to be the risk group most severely affected by HIV in the U.S (CDC, 2010), with the highest rates of HIV infection (CDC, 2010; Hall, et al., 2008). From 2006-2009, there was a 21% increase in incidence of HIV among 13-29 year olds, mainly driven by 34% increase in YMSM (Prejean, et al., 2011). YMSM are vulnerable to HIV and STIs for many reasons, including high levels of drug and alcohol abuse (Halkitis, Parsons, Wilton, 2003; Salomon, et al., 2009). A number of studies of YMSM and drug use have determined association between illicit drug use and sexual risk

behaviors (Weber et al., 2001; Celentano et al, 2006; Garofalo, et al., 2007, Thiede, et al., 2003).

Despite the well-known intersection of drug use with sexual risk behaviors leading to acquiring HIV and STIs, only a few studies have examined associations between prescription drug misuse and sexual risk behaviors, in particular among YMSM. Qualitative study of young injection drug users by Johnson, et al. (2013) found that prescription opioids, tranquilizers, and stimulants were misused in the context of sexual risk behaviors. Kelly, & Parsons (2011) found that HIV-negative MSM who reported recent prescription drugs misuse were more likely to engage in unprotected anal intercourse (UAI). Benotsch, et al. (2011) reported that men who misused prescription drugs had higher rates of HIV risk behaviors, including more sexual partners and more unprotected sex. However, neither study reported data specific for YMSM. In addition, no study to date differentiates between prescription drug classes. Since prescription drugs function differently (National Institute on Drug Abuse, NIDA, 2011) they may be associated with HIV and STI risk in dissimilar ways. While the motivations for use of prescription drugs, such as painkillers, sedatives, and stimulants vary (i.e. self-treatment of pain, insomnia, difficulty concentrating, recreational use) (Boyd, et al., 2006; McCabe, Boyd, & Teter, 2009; Silva, Kecojevic, & Lankenau, 2013), they can also alter young individuals ability to weigh risks and benefits when making safer sex decisions. These drugs can alter judgment and inhibition and lead young adults to engage in impulsive and unsafe behaviors (Royce, et al., 1997).

The purpose of this study is to examine the relationship between prescription drug misuse and sexual risk behaviors in a community sample of YMSM who recently misused prescription drugs. Specifically, we examine what types of prescription and illicit drugs used

by YMSM are associated with risky sexual practices (i.e. UAI, and higher number of sexual partners). We focus specifically on UAI as the most important route of HIV transmission among MSM (Osmond, et al., 2007). Given the significance of sexual transmission in new HIV infections among YMSM, the ongoing prescription drug epidemic, and the need to develop effective HIV interventions, it is important to determine whether prescription drug misuse is associated with high-risk sexual behavior in this population. In this paper, we report on a variety of drug and sexual behaviors, and other demographic and background characteristics potentially related to engagement in sexual risk behaviors.

2. Methods

2.1. Participants, Sampling, and Procedures

Eligible participants were males ages 18-29; had engaged in misuse of a prescription drug (i.e., opioid, tranquilizer, stimulant) at least once in the last 6 months; reported having oral or anal sex with a male partner during the past 6 months; were English speaking; and resided in Philadelphia. “Misuse” was defined as taking prescription drugs “when they were not prescribed for you or that you took only for the experience or feeling it caused” (Hernandez and Nelson, 2010; SAMSHA, 2010). Study recruitment was conducted in Philadelphia between November 2012 and July 2013. Participants were located using a combination of sampling strategies (targeted and chain-referral sampling) in variety of settings (Biernacki, & Waldorf, 1981; Watters, & Biernacki, 1998). Extensive efforts were taken to maximize diversity of the sample. For example, participants were recruited in a range of contexts, such as parks, streets, neighborhoods, bars, clubs, college campuses, and organizations serving YMSM. Recruitment was conducted at different times during the day and at night. Sampling was stratified by age (three age ranges: 18-21, 22-25, 26-29) in order

to ensure equal representation of different groups of YMSM. To further enhance the diversity of sample, only two referrals per enrolled participant were allowed into the sample as part of chain-referral sampling process. A brief screening tool was used (either in person, or over the phone) to determine eligibility for the study. Eligible individuals were verbally consented prior to conducting face-to-face structured interview. All study participants received a $25 cash incentive at the end of the interview.

A survey was developed using iSurvey Software (Contact Software Ltd, Wellington, New Zealand) and loaded onto iPads. The instrument was administered by one of two interviewers (first author or research assistant). Interviews, which lasted approximately 60 minutes, were conducted in a private office at Drexel University School of Public Health, or natural settings, such as fast food restaurants, cafes, and parks. Participants were provided with cards containing response options to facilitate standardization on some interview questions. Referral information, such as resources for HIV testing or counseling, were offered to interested participants at the end of the interview. The research protocol was approved by the institutional review board at Drexel University and a Certificate of Confidentiality was obtained from U.S. Department of Health and Human Services (USDHHS).

2.2. Measures

2.2.1. Demographic variables

All data were self-reported. Demographic information included age (utilized continuously in regression analysis), race/ethnicity (recoded dichotomously as 0="White" or 1="non-Whites"), and sexual orientation (dichotomized into 0="gay identified" and 1="non-gay identified, i.e. bisexual, heterosexual, other"). We also assessed educational status with a

question "Are you currently in school?" (0="No", 1="Yes"). Unstable housing was assessed by question "In the last 6 months, where did you sleep most nights?" (dichotomized into 0="own home/apartment, dorm, or parent's home", 1="boyfriend's, sex partner's, relative's, or foster home, motel, shelter, car, street, park, squat, halfway house or treatment center, jail, or transitional housing program"). Employment was assessed by question "Are you currently employed?" (0="No", 1="Yes"). We also asked whether the participants engaged in any sex trade (defined as sex trade being one of their sources of income) in the past six months (0="No", 1="Yes"). HIV status was self-reported by answering question "What is your HIV status?" and recorded as HIV-positive, HIV-negative, or "status unknown" on the survey and then re-coded dichotomously as HIV-positive or non-HIV-positive (HIV-negative or status unknown). We also asked if the participant has ever been diagnosed with various STI (gonorrhea, chlamydia, HCV, HPV, HSV, syphilis). If never diagnosed with any STI responses were coded 0="No", if ever diagnosed with any STI responses were coded 1="Yes".

2.2.2. Drug use variables

Prescription drug misuse was defined as taking prescription drugs "when they were not prescribed for you or that you took only for the experience or feeling it caused" (SAMSHA, 2010). Participants were asked to respond to a Yes/No question asking if they misused prescription pain pills, tranquilizers, stimulants, and other prescription pills (muscle relaxants, and erectile dysfunction drugs [EDD])in the last six months (each coded 0="No", 1="Yes"). Participants were read a list of the prescription drugs for each of drug classes noted above (e.g. Vicodin, OxyContin, Xanax, Klonapin, Adderall, Ritalin, Flexeril, Viagra, etc.), and Yes/No question was asked for each drug on the list. We also inquired on misuse of

over-the-counter (OTC) medications, i.e. antihistamines such as Benadryl, decongestants such as Sudafed, cough medicines such as Robitussin (coded 0="No", 1="Yes"). To assess the severity of current misuse, participants were asked, "Approximately, how many pills (opioids/tranquilizers/stimulants/muscle relaxants/EDD/OTC) did you use in the past six months, that were not prescribed to you, or that you took only for the experience or feeling it caused?". For each drug type (opioid/tranquilizers/ muscle relaxants/EDD/OTC), a median number of misused prescription pills was calculated to classify participants as “low” or “high” users. Participants were also asked whether they used marijuana, ecstasy, cocaine or methamphetamine in the previous six months (coded 0="No", 1="Yes"). Participants were asked whether they used prescription or illicit drugs before or during any sexual activity in the preceding 6 months (coded 0="No", 1="Yes" for each type of drug).

2.2.3. Sexual Risk Variables

The dependent variables used in this analysis included dichotomous measures assessing engagement in any unprotected anal intercourse (UAI) in the preceding 180 days. UAI is the most commonly associated with HIV transmission in YMSM. Since we were also interested in possible differences between insertive and receptive UAI, we present separate analyses for two types of UAI. Participants were asked, "In the last 6 months, how often did you use a condom during vaginal/anal insertive/anal receptive"? Response options were 0 - never, 1- less than half the time, 2-half the time, 3 – more than half the time, 4 – always. Values were dichotomized to 0 (used condoms all the time, during anal sexual acts, did not have unprotected sex) and 1 (did not use condoms all the time, during anal sexual acts, had unprotected sex). We also queried the total number of sexual partners (male, transgender, and female) during the past 180 days (continuous measure).

2.3. Data Analysis

The data were analyzed using the Statistical Package for Social Sciences (SPSS) version 20.0. Descriptive statistics were first calculated for all variables of interest. We then examined unadjusted bivariate associations between the independent variables and the three variables describing sexual behaviors. Due to the large number of comparisons, all p-values were adjusted using the false discovery rate controlling procedure (Benjamini and Hochberg, 1995). For each outcome, independent variables associated at < 0.10 were retained in multivariate models. All independent continuous variables were mean-centered (Kraemer, & Blasey, 2004). Due to different distributions of the outcome variables, two distinct regression models were used: logistic regression for anal intercourse(s), and zero-truncated Poisson regression for number of partners. We ran separate multivariate models for different classes and dimensions of prescription drug misuse (see footnote in Table 3). Odds ratios (ORs), incidence rate ratios (IRRs) and 95% confidence intervals (CIs) were calculated. For zero-truncated Poisson regression, robust standard errors for the parameter estimates were obtained as recommended by Cameron and Trivedi (2009) to control for mild violation of the distribution assumption that the variance equals the mean. To prevent over-fitting the logistic regression model, collinearity between predictor variables was assessed using a correlation matrix procedure. Variables were considered collinear if the value of the correlation coefficient was greater than 0.6 (Tabachnick and Fidell, 2006). None of variables showed this level of collinearity. Hosmer and Lemeshow tests confirmed that the predictors were a good fit for each model. The explanatory power of the models estimating unprotected sex was estimated with Nagelkerke's R^2 (Nagelkereke, 1991).

3. Results

3.1. Sample characteristics

A total of 926 individuals were screened and 221 (23.9%) met the enrollment criteria. Among the 221 eligible, 198 (89.6%) agreed to participate and were interviewed. Seven participants (3.5%) were excluded from the sample after it was determined that they either had not satisfied at least one of enrollment criteria or had already been interviewed. The final sample was comprised of 191 YMSM (Age 18-21: 60, Age 22-25: 66, Age 26-29: 65).

As shown in Table 1, the median age in our sample of YMSM was 23 years (IQR: 21, 27). Study participants were predominantly non-white (66.5%), and the majority self-identified as gay/homosexual (57.1%). A third of participants (31.7%) were students, and almost half were employed (48.2%). Over one third of the sample was either homeless or marginally housed (37.7%), and close to a quarter of participants reported engaging in sex work in the last 6 months (23.6%). HIV positivity was reported by 15.7% of participants, while 44% reported being diagnosed with at least one STI in their lifetime.

The men in our sample misused variety of prescription drugs in the last 6 months (Table 1). The most commonly misused classes of prescription drugs were tranquilizers (81.2%) and opioids (78.5%). In addition, 37.2% misused prescription opioids and 35.1% misused tranquilizers before sexual activity. Over half of the participants reported misuse of stimulants (52.4%), while smaller percentage (11.0%) used them before engaging in sex. The median number of misused prescription opioids was 15 (IQR: 2, 105), tranquilizers 12 (IQR: 1, 96) and stimulants 1 (IQR: 0, 6). Approximately one third of participants reported misusing other classes of prescription (muscle relaxants 28.8%, EDD 22.5%) and OTC (30.9%) medications. Given that participants reported smaller quantities of these three

classes of drugs, with median being 0 for each, we only report whether participants used or not these medications in the last 6 months. Over two-thirds of participants smoked marijuana (76.5%), and 57.6% used marijuana before sex in the last 6 months. Among the illicit drugs of interest, 35.1% used cocaine, 25.7% ecstasy, and 16.2% crystal methamphetamine, and a smaller percentage of the sample used these drugs before sex (15.2%, 17.3%, and 11.0%, respectively) in the last 6 months.

In Table 1 we also report sexual behaviors of our participants in the past 6 months. A small number of participants (n=14) reported only oral sex with men in the last 6 months, and were subsequently excluded from analyses. Of the men reporting anal intercourse (N=176), 57.6% engaged in UAI. Among YMSM reporting anal receptive sex (N=122), 59.0 % reported receptive UAI at least on one occasion. Among those reporting anal insertive sex (N=146), 56.2% reported having UAI. The median number of sex partners in the past six months was 5 (IQR: 2, 10; range: 1-303).

3.2. Bivariate Associations with Sexual Risk Behavior

Results from binary analyses examining correlates of having unprotected sex and number of partners are displayed in Table 2. We observed that UAI was more likely among older participants ($p < 0.01$). UAI was less likely among YMSM who self-identified as non-gay (overall UAI $p < 0.1$, and receptive UAI, $p < 0.001$). We found that current school attendance is a protective factor against engaging in insertive UAI ($p < 0.1$), while those engaged in sex work in the last 6 months were less likely to have receptive UAI ($p < 0.05$). Current students were also less likely to have a high number of sex partners ($p < 0.001$), while those with unstable housing ($p < 0.001$), who were engaged in sex work ($p < 0.001$), or were HIV + ($p < 0.05$) were more likely to have high number of sex partners. Finally,

Table 1. Participants' Demographics, Drug and Sex Behaviors in the past 6 months (N=191)

Demographics	N (%)
Age, years (median, IQR)	23 (21, 27)
Race	
Non-Hispanic White	64 (33.5)
Black/African American	71 (37.2)
Multiracial	35 (16)
Other (incl. Hispanic)	17 (8.9)
Asian/Pacific Islander	2 (1)
Native American	2 (1)
Sexual Identity	
Gay/Homosexual	109 (57.1)
Bisexual/Heterosexual/Other	82 (42.9)
Currently in school	61 (32.1)
Currently employed	92 (48.2)
Unstable housing	72 (37.7)
Engaged in sex work	45 (23.6)
HIV +	30 (15.7)
Ever Diagnosed with STI	84 (44.0)
Prescription (Rx) Drug Misuse	
Rx Pain pills	150 (78.5)
# of Pain pills used (median; IQR)	(15; 2, 105)
Used Rx Pain Pills Before Sex	71 (37.2)
Rx Tranquilizers	154 (81.2)
# of Tranqs used (median; IQR)	(12; 1, 96)
Used Rx Tranquilizers Before Sex	67 (35.1)
Rx Stimulants	100 (52.4)
# of Stimulants used (median; IQR)	(1; 0, 6)
Used Rx Stimulants Before Sex	21 (11.0)
Muscle Relaxants (MR)	55 (28.8)
Over-the counter drugs (OTC)	59 (30.9)
Erectile dysfunction drugs (EDD)	43 (22.5)
Illicit Drug Use	
Marijuana	146 (76.5)
Used Marijuana Before Sex	110 (57.6)
Ecstasy	49 (25.7)
Used Ecstasy Before Sex	29 (15.2)
Cocaine	67 (35.1)
Used Cocaine Before Sex	33 (17.3)
Crystal Meth	31 (16.2)
Used Crystal Meth Before Sex	21 (11.0)
Sex Behaviors	
Number of Partners (median, IQR)	(5; 2, 10)
Engaged in unprotected intercourse	
Anal (N=176)	102 (57.6)
Anal Receptive (N=122)	72 (59.0)
Anal Insertive (N=146)	82 (56.2)

Table 2. Bivariate Associations of Individual Characteristics with Sexual Risk Behavior in the Past 6 months

Independent Variable	Any UAI, N=177	Receptive UAI, N=122	Insertive UAI, N=146	Number of sex partners
	Unadjusted OR (95% CI)	Unadjusted OR (95% CI)	Unadjusted OR (95% CI)	**N=191** Unadjusted IRR (95% CI)
Demographics				
Age (years)	**1.14 (1.04, 1.25)****	**1.10 (0.98, 1.24)†**	**1.14 (1.03, 1.27)***	1.09 (0.96, 1.22)
Race (non-White)	0.60 (0.31, 1.15)	0.54 (0.25, 1.18)	0.70 (0.34, 1.43)	1.53 (0.86, 2.72)
Sexual identity (non-gay)	**0.56 (0.31, 1.03)†**	**0.26 (0.12, 0.58)*****	0.70 (0.36, 1.36)	0.94 (0.46, 1.91)
Currently in school	0.69 (0.37, 1.31)	0.84 (0.40, 1.78)	**0.52 (0.26, 1.06)†**	**0.38 (0.23, 0.61)*****
Currently employed	1.16 (0.64, 2.11)	1.11 (0.54, 2.29)	1.12 (0.58, 2.15)	0.88 (0.44, 1.76)
Unstable housing	0.92 (0.49, 1.70)	0.88 (0.42, 1.83)	1.02 (0.51, 2.07)	**2.75 (1.51, 5.03)*****
Engaged in sex work	0.67 (0.33, 1.36)	**0.43 (0.18, 1.00)***	1.13 (0.50, 2.58)	**3.76 (1.97, 7.20)*****
HIV +	1.59 (0.69, 3.62)	1.50 (0.59, 3.83)	2.13 (0.82, 5.50)	**1.89 (0.88, 4.07)†**
Dx with STI Ever	**1.89 (1.02, 3.48)***	**2.21 (1.03, 4.73)***	**1.93 (1.00, 3.76)***	0.97 (0.50, 1.89)
Prescription Drugs				
Rx Pain Pills	1.70 (0.84, 3.45)	**2.15 (0.97, 4.78)†**	1.75 (0.80, 3.82)	1.63 (0.81, 3.30)
# of PP (high vs. low)	1.48 (0.81, 2.70)	1.42 (0.68, 2.99)	1.37 (0.71, 2.65)	1.59 (0.81, 3.12)
Used Before Sex	**2.00 (1.05, 3.82)***	**2.00 (0.86, 4.67)†**	1.56 (0.78, 3.10)	1.39 (0.70, 2.76)
Rx Tranquilizers	1.17 (0.55, 2.50)	1.31 (0.55, 3.13)	1.62 (0.72, 3.63)	1.16 (0.45, 2.97)
# of Tranq. (high vs. low)	1.22 (0.67, 2.23)	1.47 (0.70, 3.10)	1.29 (0.67, 2.48)	1.60 (0.82, 3.15)
Used Before Sex	**0.48 (0.26, 0.90)***	0.54 (0.25, 1.19)	**0.54 (0.27, 1.08)†**	1.38 (0.70, 2.72)
Rx Stimulant	0.83 (0.46, 1.51)	1.06 (0.52, 2.18)	0.83 (0.43, 1.60)	1.11 (0.55, 2.24)
# of Stimul. (high vs. low)	0.93 (0.51, 1.68)	1.14 (0.55, 2.35)	0.98 (0.51, 1.89)	1.05 (0.52, 2.10)
Used Before Sex	1.17 (0.43, 3.19)	1.64 (0.48, 5.67)	1.19 (0.40, 3.54)	**2.42 (0.87, 6.74)†**
Muscle Relaxants (MR)	**1.87 (0.95, 3.66)†**	**2.97 (1.21, 7.27)***	1.64 (0.80, 3.39)	1.21 (0.54, 2.72)
OTC	**1.73 (0.89, 3.37)†**	1.58 (0.70, 3.57)	1.43 (0.70, 2.94)	1.28 (0.64, 2.57)
EDD	1.11 (0.55, 2.24)	1.10 (0.46, 2.60**)**	1.12 (0.53, 2.41)	**3.09 (1.55, 6.16)*****
Illicit drugs				
Marijuana	1.07 (0.52, 2.18)	1.34 (0.57, 3.12)	0.77 (0.34, 1.72)	1.24 (0.53, 2.92)
M. Used Before Sex	1.06 (0.58, 1.95)	1.04 (0.50, 2.15)	0.87 (0.45, 1.70)	1.38 (0.70, 2.72)
Ecstasy	**2.39 (1.15, 4.93)***	**2.55 (1.10, 5.89)***	**2.50 (1.13, 5.53)***	**2.23 (1.08, 4.63)***
E. Used Before Sex	**3.16 (1.21, 8.25)***	***3.55 (1.11, 11.31)****	**2.50 (0.96, 6.27)†**	1.69 (0.87, 3.28)
Cocaine	1.32 (0.70, 2.47)	1.64 (0.75, 3.56)	1.41 (0.71, 2.81)	**2.61 (1.36, 5.00)****
C. Used Before Sex	1.33 (0.59, 3.00)	1.11 (0.40, 3.09)	1.83 (0.74, 4.56)	**3.77 (1.86, 7.64)*****
Crystal Meth	**2.99 (1.21, 7.37)***	2.10 (0.75, 5.80)	***5.85 (1.91, 17.94)******	**5.43 (2.89,10.21)*****
CM. Used Before Sex	***3.55 (1.14, 11.03)****	***5.29 (1.14, 24.59)****	***4.93 (1.37, 17.75)****	**4.86 (2.31, 10.26)*****

† < 0.1; * <0.05; ** <0.01; * <0.001; *italicized – Fisher test determined statistical significance***

UAI (both receptive and insertive) was more likely among YMSM with a history of STI diagnosis ($p < 0.05$).

Misuse of prescription opioids in the last 6 months was associated with slightly increased odds of engaging in receptive UAI ($p < 0.1$), while misuse of prescription opioids before sex was associated with the greater odds of engaging in UAI ($p < 0.05$), and in particular in receptive UAI ($p < 0.1$). Interestingly, those who misused tranquilizers before sex were less likely to engage in UAI ($p < 0.05$), in particular insertive UAI ($p < 0.1$). Use of stimulants before sex was slightly associated with increased number of partners ($p < 0.1$). Those who misused muscle relaxants were more likely to engage in UAI ($p < 0.1$), in particular receptive UAI ($p < 0.05$). Similarly, misuse of OTC was slightly associated with increased odds of UAI ($p < 0.1$), while use of EDDs was associated with reporting high number of sex partners ($p < 0.001$).

Among illicit drugs, UAI was more likely among those who used ecstasy, ecstasy before sex, crystal methamphetamine (with exception of receptive UAI), and crystal methamphetamine before sex (p values ranged from < 0.1 to 0.001). Finally, odds of having higher number of sex partners was reported by those who used ecstasy ($p < 0.05$), cocaine ($p < 0.01$), and crystal meth ($p < 0.001$), or used cocaine ($p < 0.01$), and crystal meth ($p < 0.001$) before sex in the last 6 months.

3.3. Multivariate Associations with Sexual Risk Behavior

Table 3 presents results from multiple regression analyses performed to describe the relationships between recent prescription drug misuse and sexual risk behaviors. Multivariate models were conducted for each class of prescription drug associated with a particular sexual risk behavior at $p<0.1$. After controlling for effects of demographic variables and illicit drug use (variables associated with a particular sexual risk behavior at $p<0.10$), UAI remained more likely among participants who misused muscle relaxants (OR=1.90, 95% CI=0.91,

3.95) and OTC medications (OR=1.86, 95% CI: 0.91, 3.80). Similar to bivariate findings, UAI remained more likely among participants who misused prescription opioids before sex (OR=1.96, 95% CI: 0.96, 3.99), while participants who misused tranquilizers before sex were less likely to engage in unprotected anal sex (OR=0.41, 95% CI: 0.20, 0.82).

Table 3. Multivariate Associations of Prescription Drug Misuse with Sexual Risk Behavior in the Past 6 months

Rx class	**Any UAI (N=177)**	**Receptive UAI (N=122)**	**Insertive UAI (N=146)**	**Number of partners (N=191)**
	OR (95% CI)	OR (95% CI)	OR (95% CI)	IRR (95% CI)
Rx Opioids	-	**3.11 (1.20, 8.04)*[c]**	-	-
Used Rx Opioids Prior Sex	**1.96 (0.96, 3.99)†[b]**	**2.53 (0.92, 6.97)†[d]**	-	-
Used Rx Tranquilizers Prior Sex	**0.41 (0.20, 0.82)*[b]**	-	**0.30 (0.13, 0.71)**[e]**	-
Used Rx Stimulants Prior Sex	-	-	-	1.39 (0.56, 3.45)[f]
Muscle Relaxants (MR)	**1.90 (0.91, 3.95)†[a]**	**4.09(1.42, 11.80)**[c]**	-	-
OTC	**1.86 (0.91, 3.80)†[a]**	-	-	-
EDD	-	-	-	1.28 (0.59, 2.76)[e]

† < 0.1; * <0.05; ** <0.01; * <0.001; R^2 in multivariate models ranged from 0.17 to 0.34.**

[a] – adjusted for demographics (age, sexual identity, and STI diagnosis) and use of illicit drugs (ecstasy and crystal meth)

[b] – adjusted for demographics (age, sexual identity, and STI diagnosis) and use of illicit drugs before sex (ecstasy and crystal meth)

[c] – adjusted for demographics (age, sexual identity, sex work, and STI diagnosis) and use of illicit drugs (ecstasy)

[d] - adjusted for demographics (age, sexual identity, sex work, and STI diagnosis) and use of illicit drugs before sex (ecstasy and crystal meth)

[e] - adjusted for demographics (age, school status, and STI diagnosis) and use of illicit drugs before sex (ecstasy and crystal meth)

[f] - adjusted for demographics (school status, unstable housing, sex work, HIV diagnosis) and use of illicit drugs (ecstasy, cocaine, and crystal meth)

In multivariate models, receptive UAI was significantly more likely among those who misused opioids (OR=3.11, 95% CI: 1.20, 8.04), and muscle relaxants (OR=4.09, 95% CI: 1.42, 11.80). Receptive UAI also remained more likely among participants who misused

prescription opioids before sex (OR=2.53, 95% CI: 0.92, 6.97). Insertive UAI less likely among those who misused tranquilizers before sex (OR=0.30, 95% CI: 0.13, 0.71). Finally, after controlling for demographic and illicit drug use variables, no prescription drug was associated with having higher numbers of sex partners.

4. Discussion

To our knowledge, this represents one of the first studies to examine associations of prescription drugs misuse and engaging in sexual risk behaviors in a sample of YMSM who misuse drugs, a population that continues to be the risk group most severely affected by HIV in the U.S. (CDC, 2010). In this study we found that YMSM, recruited from a variety of settings in Philadelphia, were a heterogeneous population reporting use of a variety of prescription drugs. While this is a study of YMSM who are current misusers or who have misused prescription drugs in the past 6 months, the study corroborates previous limited findings on prescription drug misuse among MSM (Benotsch, et al., 2011; Kelly & Parsons, 2011), which indicated possible associations between prescription drug misuse and UAI. Further, we have also identified specific classes of prescription drugs that are more likely to be associated with engagement in various sexual risk behaviors among YMSM. One of the strengths of this paper is a separate analyses for receptive and insertive UAI, which contributes to limited literature indicating that certain drugs may be more associated with receptive UAI compared to insertive UAI (Celentano, et al., 2006).

In the present sample, UAI was associated with misuse of prescription opioids, muscle relaxants and OTC medications. One of the important findings of this study is that the misuse of prescription opioids and muscle relaxants was particularly more likely among those who engaged in receptive UAI. It is possible that YMSM use prescription opioids and

muscle relaxants to enable, or to dull the pain of receptive anal sex. Similarly to other studies examining drug use before sex (Stueve, et al., 2002, Clatts, et al., 2007), we found positive association between use of opioids before sex and UAI. Association of OTC medications (such as cough syrup) with UAI possibly adds to finding by Peters at al. (2007), who found that sexual activity was significantly associated with use of codeine cough syrup among sexually active male youths. However, we found that those who misused prescription tranquilizers before sex had lesser odds of engaging in UAI, and in particular engaging in insertive UAI. While it is possible that tranquilizers at large do not alter judgment and inhibition before sex as much as pain pills or muscle relaxants, this finding requires further investigation. Further, we are cautious in interpreting whether the use of prescription drugs before sex is coincidental or intentional (Johnson et al., 2013). Less than 50% of those who used prescription pills in the past 6 months have used them before sex (opioids 47%, tranquilizers, 44%, stimulants, 21%), which suggests that prescription pills were misused for variety of reasons. Literature suggests that the association between illicit drugs use and sexual risk behaviors among YMSM differs depending on various other factors such as personality characteristics (Dudley, et al., 2004; Mustanski, et al., 2011), mental health (Mustanski, et al., 2007) or circumstances surrounding the sexual encounter (Berry, Raymond, & McFarland, 2007, Stueve, et al., 2002). It is likely that these findings are applicable to prescription drugs as well.

It is also important to note that a number of associations between prescription drugs and unprotected sex were confounded by use of illicit drugs use. Overall, the most commonly used illicit drug was marijuana, with over three quarters of participants having used it in the last 6 months, and over half of the sample using it before sex. While some other studies

found an association between marijuana use and sexual risk in YMSM (Celentano, et al., 2006), we did not observe such an association, possibly due to almost universal use. In all multivariate models, use of "club drugs" (ecstasy in particular and crystal methamphetamine to the lesser extent) was one of the strongest predictors of engaging in UAI. This confirms previous findings of strong association between use of these drugs and unprotected sex in YMSM (Clatts, Golksmat, & Yi 2005; Garofalo et al., 2007, Halkitis, Mukherjee, & Palamar, 2009). Unlike prescription pills, the majority of those who used illicit drugs in the last 6 months did so in the context of sexual activity (e.g. marijuana 75%, ecstasy 59%, crystal meth 64%), suggesting a stronger association. It is also likely that participants combined different types of illicit and prescription drugs (i.e. "club drugs" and EDDs, Halkitis, Green, 2007) to counteract the depressive effects of some of drugs on sexual behavior (Mansergh, et al., 2001).

In addition, there was a strong association of some of demographic factors and UAI. Similarly to some other studies of MSM (Stokes, Vanable, McKirnan, 1996), gay identifying YMSM were more likely than bisexual/heterosexual identifying YMSM to engage in unprotected receptive anal sex. We also observed that older participants in the study were more likely to engage in UAI. Researchers have speculated that connection to the gay community increases chances of engaging in sexual risk behaviors (Grov, Bux, Parsons, & Morgenstern, 2009). It is likely that older and/or self-identified YMSM have access to settings where drug use is prevalent or is associated with sex (i.e. clubs, bathhouses) (Stall, et al., 2001). There was no association between self-reported sexual identity (gay vs. non-gay) and engagement in insertive UAI. However, non-gay identified YMSM engaged in less receptive anal sex, which possibly indicates that this subsample of YMSM perceives

receptive anal sex as more stigmatizing than insertive anal sex. Consequently, they enacted receptive anal sex less frequently than self-identified gay YMSM. Similarly, those engaging in sex work were more likely to engage in protected receptive UAI, but as likely to engage in insertive UAI as other YMSM. It is also possible that some other individual or network-level risk factors play important role in sexual risk behaviors among YMSM (Traube, et al., 2013; Mustanski, et al., 2011).

Results from this study also indicate that, while YMSM, on average, report a high number of sexual partners, there is less robust association between higher number of sex partners and prescription drugs. Although we found bivariate associations between high number of sex partners and misuse of EDDs, multivariate analysis indicated no significant relationships between these variables. It is, however, important to note that almost one quarter of YMSM in our sample reported use of EDDs in the last 6 months, which is significantly more than previously reported in YMSM population (Kipke, et. al., 2007). In all of multivariate models investigating association of prescription drugs and higher number of sex partners, we observed that unstable housing and engagement in sex work were strong independent predictors of greater number of partners. Similarly to other studies (Lankenau, et al., 2005; Kipke et al, 2007), this indicates that unsafe social environment may act synergistically with having a high number of sexual partners.

Researching correlates of risky sexual behavior can serve the purpose of identifying behaviors and individuals that are target of prevention programs. While sexually active YMSM can take steps to choose less risky behaviors, such as not misusing drugs, using condoms consistently and correctly if they have anal sex, or reducing the number of sex partners (CDC, 2011), it is also important for health-care providers and public health

practitioners to ensure that YMSM who are engaging in these behaviors receive risk-reduction interventions (CDC, 2013). Our study findings could therefore guide practitioners and public health community to devising strategies and policies that will prevent negative effects of prescription drug misuse on YMSM, and that will benefit YMSM individuals and their communities. Providers serving YMSM should routinely ask about prescription drug misuse and refer those needing support to appropriate services. Screening and brief interventions at the time of direct contact have shown promise in reducing drug use (Das, et al., 2010), or sexual risk behaviors (Kegeles, et al., 1999) among MSM and could have promise in reducing misuse of prescription medications in the same population.

While this study is important in investigating associations between prescription drug misuse and risky sexual behaviors among YMSM, it also has several limitations that need to be considered. First, results are based upon cross-sectional data, which limits conclusions to associations between variables rather than identifying causal relationships. Second, the sample is comprised of YMSM in Philadelphia, who were recently engaged in prescription drug misuse. Although we conducted an extensive outreach-based sampling method in order to derive a representative sample of YMSM, these results may not generalize to the larger population of YMSM who do not engage in these risk behaviors, or to YMSM in other cities, or non-urban areas. Finally, data are based on self-report and may have been subject to response and recall bias, especially among YMSM concerned with admitting and describing their drug use and risky sexual behaviors, therefore the findings should be interpreted with prudence. However, efforts were made to correct social desirability issue by conducting interviews in quiet and secure spaces and to maximize the accuracy of the data by restricting our questions to recent (past six months) behaviors and outcomes.

In summary, the results of this study fill a gap in the YMSM and HIV literature on prescription drug misuse and its relationship to risky sexual behavior. While prescription drugs have legitimate uses, a significant number of sexual minority youth uses them for different reasons than those intended (Corliss, et al., 2010). One of these reasons might include engaging in risky sexual behaviors. Overall, results of this study demonstrate that substantial numbers of YMSM who currently misuse prescription drugs are at heightened risk of engaging into risky sexual behaviors. This is of concern, given that unprotected intercourse, and in particular unprotected anal intercourse is the most common route of HIV transmission among YMSM (CDC, 2009). These results suggest that prescription drug misuse may be a factor in risky sexual behavior, while the role of prescription drug misuse is likely influenced by other factors, such as illicit drug use and social environment. Results of our study show that nonmedical users of prescription medications are indicative of high-risk population of YMSM who are the important target for public health interventions. These results underscore the need for the development of interventions to address this prescription drug misuse among YMSM.

Chapter 3: Childhood Abuse, Discrimination, and Mental Distress as Risk Factors for Increased Prescription Drug Misuse, Illicit Drug Use, and Sexual Risk Behaviors among YMSM

Abstract

Background: Childhood abuse, discrimination and mental distress experienced by young men who have sex with men (YMSM) may be associated with increased prescription drug misuse (i.e. opioids, tranquilizers, and stimulants), illicit drug use and increased sexual risk behaviors.

Methods: We conducted a cross-sectional analysis of associations of individual and psychosocial factors with higher levels of substance use, unprotected anal intercourse (UAI) and higher number of sex partners in a sample of 191 Philadelphia's YMSM who currently misuse prescription drugs.

Results: In a bivariate analysis, we observed strong associations between high levels of childhood abuse, discrimination, and mental health stress and increased prescription drug misuse, illicit drug use, and risky sexual behaviors. In multivariable models, childhood abuse was associated with increased prescription opioid and tranquilizer misuse. Experiences of racism among racial minority participants were significantly associated with reduced misuse of prescription tranquilizers. Additionally, distress was associated with increased prescription opioids misuse, while somatization was associated with illicit drug use. The strongest predictors of increased prescription drug misuse were older age and non-gay/homosexual identification (opioids and tranquilizers), and being White (stimulants). Older age was also associated with UAI, while being White was also strongly associated illicit drug use and UAI. Additional analyses indicated that illicit drug use, but not prescription opioids, significantly mediate the impact of stressors on having a high number of sex partners.

Conclusions: Associations of stressors with substance use and sexual risk behaviors among YMSM are complex and offer opportunities for additional research. Our findings show that risk behaviors in YMSM must be addressed in sync with psychosocial stressors by prevention programs and policies.

1. Introduction

Prescription drugs have become a serious public health problem among young adults in the US (Johnston, et al., 2010). Most research on prescription drug misuse among young adults has focused on student population (Arria, et al., 2008; Ford, Arrastia, 2008; Teter, et al., 2010), or in high-risk groups of young adults, such as homeless persons, injection drug users, or polydrug users (Lankenau, et al., 2012). These studies present limited data on young men who have sex with men (YMSM), a population at the greatest risk for negative health outcomes. For example, YMSM continue to be at elevated risk for substance use and abuse when compared to their heterosexual peers (Russell, Driscoll, Truong, 2002). Furthermore, YMSM are the risk group most severely affected by HIV in the U.S (Centers for Disease Control and Prevention, CDC, 2010; Hall et al., 2008). From 2006-2009, there was a 21% increase in incidence of HIV among 13-29 year olds, mainly driven by 34% increase in YMSM (Prejean, et al., 2011).

Previous research has established a connection between alcohol, illicit drug use (cocaine, methamphetamine, ecstasy, ketamine), unsafe sex, and HIV among YMSM (Celentano, et al., 2006; Garofalo, et al., 2007; Kipke, et al., 2007; Stueve, et al., 2002; Parsons, et al., 2005; Purcell, et al., 2001). However, a few studies have explored associations of prescription drug misuse and sexual risk behavior. Kelly & Parsons (2011) found that HIV-negative MSM who recently misused prescription drugs were more likely to engage in unprotected anal intercourse (UAI). Benotsch et al. (2011a) reported that men who misused prescription drugs had higher rates of HIV risk behaviors, including more sexual partners and more unprotected sex. However, neither study reported data specific for YMSM, ages 18-29. A qualitative study of young injection drug users by Johnson, et al.

(2013) found that prescription opioids, tranquilizers, and stimulants were misused in the context of sexual risk behaviors, yet this was not specific for YMSM. Kecojevic, et al. (2014, manuscript submitted) reported that misuse of prescription opioids before sex, and recent use of muscle relaxants, and over-the-counter (OTC) medications was associated with UAI in YMSM. In the same study, no prescription drug class was associated with higher number of sex partners after adjusting for socio-demographics and illicit drug use.

Although YMSM abuse alcohol and drugs for many of the same reasons as their heterosexual peers, there are other factors that may contribute to substance abuse in YMSM. One of the most commonly invoked explanations for disparities in health behaviors (including drug use and sexual risk behaviors) in YMSM is the role of social environment. Research consistently finds higher rates of childhood abuse, including emotional, physical, and sexual abuse, among lesbian, gay, bisexual and transgender (LGBT) individuals relative to heterosexuals (Corliss, Cochran, Mays, 2002; Austin et al., 2008; Friedman, et al., 2011; Kecojevic, et al., 2012). Evidence suggests that these experiences of child abuse are associated with negative outcomes for sexual minorities including increased substance abuse (Kalichman, et al., 2001; Hughes, Eliason, 2002), sexual risk behaviors and HIV (Paul, Catania, Pollack, and Stall, 2001; Arreola, et al., 2005; Rosario, Schrimshaw, Hunter, 2006; Welles et al., 2009), and mental health problems (Huebner, et al., 2004; McLaughlin, et al., 2012). Although it has been reported that a significant proportion of gay/bisexual men experience physical abuse or early forced-sex early in their development (Friedman, et al., 2008), very few studies examined childhood abuse in specifically younger samples of MSM (Feldman, 2010; Mustanski, et al., 2011). Furthermore, while it has been reported that childhood abuse was strongly associated with benzodiazepine dependence in a sample of

club goers in South Florida (Kurtz, et al., 2011), it is unclear whether this holds for other prescription drugs, or among YMSM.

Studies have shown that many YMSM report numerous experiences of discrimination including homophobia and racism (Mays, Cochran, 2001; Wong, et al, 2010; Bontempo, D'Augelli, 2002). These factors have been found to contribute to drug use (Wong, et al, 2010; Marshall, et al., 2008; Kalichman, et al., 2001, Harper, Schneider, 2003; Meyer, 2003). Experiences of homophobia or racism, especially in pervasively homophobic culture, can also act as significant psychological stressors linked to increased sexual risk taking (Huebner, et al., 2004; Mizuno, Borkowf, Millet, et al., 2012). Evidence suggests that exposure to harassment and discrimination predicted mental health problems in YMSM (D'Augelli, 2002; Meyer, 2003; Bontempo, D'Augelli, 2002). In addition, while all YMSM share a minority status, they are a very diverse group and some are at even greater risk for victimization and social marginalization. YMSM who are also racial/ethnic minorities are subjected to multiple minority and life stressors, including stigma associated with their sexual orientation, rejection by their cultural or ethnic community, and prejudice and discrimination associated with their race/ethnicity within gay community (Cochran & Mays, 1994; Diaz, et al., 2001; Greene, 1997).

Additionally, many YMSM may internalize antigay attitudes. Internalized homophobia is the degree to which an LGBT individual internalizes the antigay sentiments of the larger heterosexual society and represent an internal form of stress (Meyer, 1995, Meyer, 2003). Internalized homophobia has been linked to greater substance use (Ross et al., 2001), risky sexual behaviors (Meyer, & Dean, 1998), or unrecognized HIV infection and reduced disclosure of serostatus (Young, et al., 2011). In addition, Ross, Rosser, Neumaier,

et al. (2008), found that the internalized homophobia was significantly associated with depression. However, there is limited understanding on how these risk factors are associated with prescription drug misuse patterns and sexual risk behaviors in YMSM.

Several studies of YMSM have found that mental health burden is significantly associated with increased risk behaviors (Rosario, et al., 2006). For example, research on mental health of youth populations have documented that sexual minority youth are at elevated risk for depressive symptoms compared with their heterosexual peers (Cochran, 2001; D'Augelli, 2002; Fergusson, Horwood, Ridder, & Beautrais, 2005). In addition, a few studies that have examined anxiety symptoms have also found them to be elevated among sexual minority youth relative to heterosexuals (Fergusson, Horwood, & Beautrais, 1999; Lock, & Steiner, 1999). Previous studies have found that those YMSM with higher depression scores engage in higher levels of sexual risk behaviors (Strathdee, et al., 1998), have more sex partners (Perdue, Hagan, Thiede, & Valleroy, 2003), and engage in unprotected anal intercourse (UAI; Mustanski, et al., 2007). YMSM suffering from mental health distress have been found to self-medicate with alcohol or drugs (Anhalt, & Klein, 1976, Ford, & Schroeder, 2009, Sullivan et al., 2006). Prescription drugs in particular may have appeal among YMSM as a means of self-medication, or self-treatment due to their perceived safety and psychopharmacological specificity (Cicero et al., 2005, Quintero, 2009, McCabe et al., 2009).

1.1. Current Study

Taken together, prior research suggests a relationship between adverse childhood experiences (i.e. abuse), experiences of social discrimination, depression, anxiety and stress symptoms and levels of drug use and sexual risk behaviors among sexual minority males.

However, no study has examined the effect of above experiences as predictors of levels of prescription drug misuse among YMSM. Towards this end, the current investigation had three primary aims. First, the study sought to determine whether childhood adverse experiences and/or social discrimination are associated with current mental health symptomatology in this sample of YMSM. We hypothesized that the YMSM who report high levels of childhood adverse experiences and/or social discrimination would report increased levels of mental health distress, i.e. depressive, anxiety, somatization and stress symptoms. Second, building on previous conceptualizations of multiple stressors influencing behaviors of YMSM (Wong, et al, 2010; Meyer, 2003; Rosario, et al., 2002) our study examines the influence of these stressors on substance use and risky sexual behaviors. We hypothesized that YMSM who report higher levels of stressors would report higher substance use and/or increased sexual risk behaviors. Third, we examined drug use (prescription drug misuse, and illicit drug use) as mediators of the relationship between adverse childhood experiences, experiences of social discrimination, depression, anxiety, stress symptoms and sexual risk behaviors. A conceptual model (Figure 1) that examines these relationships is based on Minority Stress Theory (Meyer, 2003) and Problem Behavior Theory (Jessor, 1991). According to Meyer's theory, members of stigmatized minority groups (e.g. sexual minority) such as YMSM are exposed to a variety of stressors that impact their mental health and well-being. Problem Behavior Theory implies that behaviors such as substance abuse are a part of the behavioral system that interacts with the both personality and environment. In our model stressors impact mental health; they all further impact problem behaviors such as substance use or sexual risk behaviors.

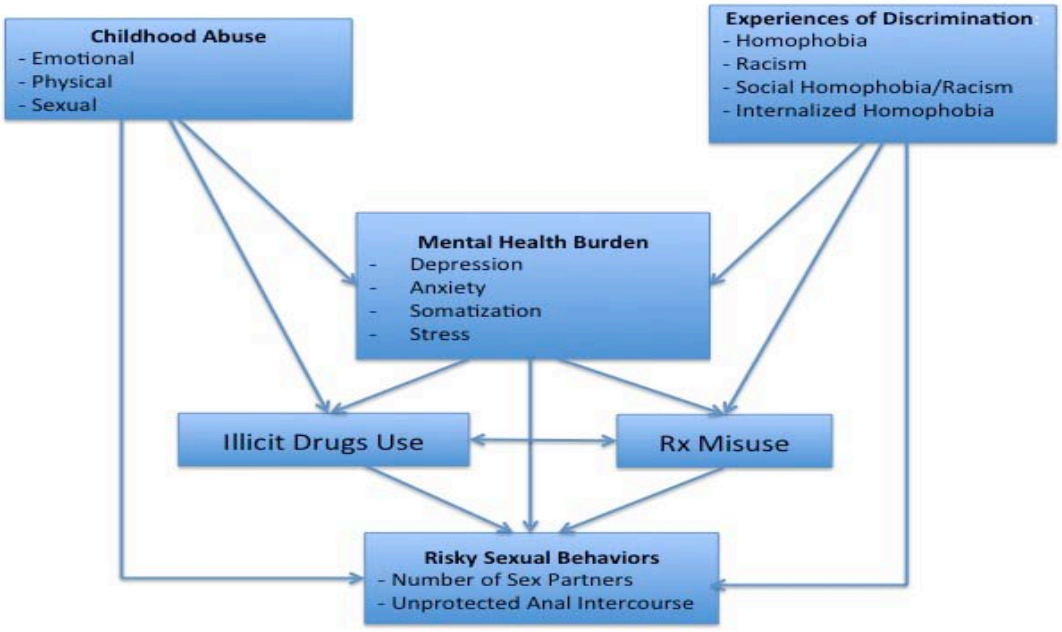

Figure 1. Conceptual model linking childhood abuse, experiences of discrimination, and mental health burden to substance use and risky sexual behaviors.

2. Methods

2.1. Sample

Data for the current study were collected as a part of mixed method study conducted in Philadelphia, Pennsylvania from November 2012 to July 2013. Eligible participants were between the ages of 18-29; had engaged in misuse of a prescription drug (i.e., opioid, tranquilizer, stimulant) in the last 6 months; reported having sex (oral or anal) with a male partner during the past 6 months; were English speaking; and resided in Philadelphia. "Misuse" was defined as taking prescription drugs "when they were not prescribed for you or that you took only for the experience or feeling it caused" (Hernandez, & Nelson, 2010; SAMSHA, 2010).

Due to the challenges inherent in sampling from a population such as drug users, it was not feasible to collect a random sample. Instead, the recruitment strategy for the study involved standard techniques for reaching hidden population, i.e. a combination of outreach-based sampling strategies (targeted and chain-referral sampling) in variety of settings (Biernacki, & Waldorf, 1981; Watters, & Biernacki, 1998). Since there are no registries from which to draw YMSM, the sample can be viewed as a convenience sample, although major efforts were undertaken to try to maximize the representativeness of the sample. For example, the recruitment was conducted in person, distributing recruitment cards, and by placing advertisement in a range of places such as parks, streets, bars, clubs, neighborhoods, college campuses, and organizations serving YMSM, and finally on craigslist.org. Recruitment was conducted at different times during the day and at night. To further enhance the diversity of sample, only two referrals per enrolled participant were allowed into the sample as part of chain-referral sampling process. A brief screening tool was used to determine eligibility (either in person, or over the phone). Eligible participants provided a verbal informed consent and were compensated $25 cash for their participation. Sampling was stratified by age (three age ranges: 18-21, 22-25, 26-29) in order to ensure adequate and equal representation of different age groups of YMSM.

A cross-sectional survey was developed using iSurvey Software (Contact Software Ltd, Wellington, New Zealand) and loaded onto iPads. The instrument was administered during face-to-face interviews with enrolled participants by one of two interviewers (first author or research assistant). Interviews, lasted approximately 60 minutes, were conducted in a private office at Drexel University School of Public Health, or natural settings, such as fast food restaurants, cafes, and parks. Participants were provided with cards containing

response options to facilitate standardization on some interview questions. Referral information, such as resources for HIV testing or counseling, were offered to interested participants following the interview. The research protocol was approved by the Institutional Review Board (IRB) at Drexel University and a Certificate of Confidentiality was obtained from U.S. Department of Health and Human Services (USDHHS).

2.2. Measures

2.2.1. Demographics

Demographic characteristics included age, race/ethnicity (recoded dichotomously as 0="White" or 1="non-Whites"), sexual orientation (dichotomized into 0="gay identified" and 1="non-gay identified, i.e. bisexual, heterosexual, other"), and self-reported HIV status (re-coded dichotomously as HIV-positive or non-HIV-positive, i.e. HIV-negative or status unknown). Because there may be potential age-related differences in experiences of abuse, and various minority stressors and other variables of interest (e.g., drug use, UAI, number of partners), we elected the conservative approach of including age as a demographic covariate. We also asked if the participant has ever been diagnosed with various STI (gonorrhea, chlamydia, HCV, HPV, HSV, syphilis). Responses were coded 0="No", 1="Yes".

2.2.2. Self-reported Psychological Distress

2.2.2.a. The Brief Symptom Inventory, BSI-18

The Brief Symptom Inventory, BSI-18 (Derogatis, 2000) was used to assess levels of depression, anxiety and somatization. The BSI is a well-known, self-reported measure of psychological distress in the prior week, and it has been previously used in YMSM population (Mustanski, Garofalo, & Emerson, 2010). Participants were given a list of problems that they might have experienced in the past 7 days, and asked to indicate how

much that problem has distressed or bothered them (e.g., “In the past 7 days, how much were you distressed by feeling lonely?”) on a 5-point scale that ranges from 1=”not at all” to 5=”extremely”. Following the BSI-18 scoring instructions, raw scores were converted to T scores using gender specific community norms (Derogatis, 2000). Higher scores indicate more depression, anxiety, or distress arising from perceptions of bodily dysfunctions, i.e. somatization. However, because the BSI clinical case cutoff likely has a low positive predictive value in this population (Mustanski, Garofalo, & Emerson, 2010), we are not reporting on prevalence of depression, anxiety, and somatization in our sample. Cronbach’s alpha for the overall scale was 0.93 (α=0.88, 0.82, 0.84 for the depression, anxiety, and somatization subscales, respectively).

2.2.2.b. The Perceived Stress Scale

Perceived stress was assessed using the Perceived Stress Scale (PSS), a 10-item self-report questionnaire with strong reliability and validity (Cohen, Kamarck, & Mermelstein, 1983). Respondents were asked to indicate how often they have felt or thought a certain way in the past month (e.g., “In the last month, how often have you been upset because of something that happened unexpectedly?”) on a 5-point scale that ranges from 0=”never” to 4=”very often”. Some of the items were scored in reverse. Responses are then summed to indicate the level of perceived (subjective) stress. The PSS is not a diagnostic instrument and there are no score cut-offs. However, higher scores indicate more perceived stress. In the current study, Cronbach’s alpha was 0.86.

2.2.3. Self-reported Childhood Abuse

Questions defining emotional, physical, and sexual abuse were adopted from the Childhood Trauma Questionnaire (CTQ) (Bernstein, et al., 1994). Fifteen items assessed

abuse during childhood. Participants were asked to indicate how often they were abused when growing up (e.g. “When I was growing up....someone tried to make me do sexual things or watch sexual things”). Responses were scored on a Likert-type scale that ranged from 1=“never” to 5=“very often”. Cronbach’s alpha for the overall scale was 0.93 (α=0.90, 0.88, 0.93 for the emotional, physical, and sexual subscales, respectively). The CTQ scoring guidelines also indicate four abuse classifications for each scale: none or minimal, low to moderate, moderate to severe, and severe to extreme. To calculate prevalence rates for each of the three subscales in the current sample, we classified any score above the “none or minimal” range as indicating abuse. This threshold is recommended by the authors of the CTQ for maximizing identification of any abuse while keeping specificity to an acceptable level (Bernstein & Fink, 1998).

2.2.4. Self-reported Victimization

Items that measured lifetime experiences of discrimination, including racism and homophobia, were adapted from Díaz et al. (2001) and Wong et al. (2013). They were assessed with a four-item Likert-type scale ranging from 0=“never” to 3=“many times”. Higher scores indicate greater experiences of discrimination.

2.2.4.a. Racism

The composite measure of racism was a four-item scale (α=0.74) describing lifetime experience of verbal harassment, verbal threats, physical attack, and police harassment due to race or ethnicity.

2.2.4.b. Homophobia

The composite measure of experienced homophobia was a six-item scale (α=0.77) describing lifetime experience of verbal harassment and threats, physical attack, police

harassment because of sexual orientation, how frequently their friends and family had made fun of gay people around them, as well as if a participant had ever needed to move in order to avoid harassment or attacks due to their sexual orientation.

2.2.4.c Social Racism/Homophobia

The composite measure of socio-sexual racism was a four-item scale (α=0.74) that assessed whether respondents felt uncomfortable in gay-identified spaces, or on-line due to their race or ethnicity as well as whether they were ever rejected for sex, or felt objectified by sexual partners because of their race or ethnicity. The socio-sexual racism experiences were assessed with a four-item Likert-type scale ranging from 0="strongly disagree" to 3=" strongly agree".

2.2.5. Internalized homophobia

Internalized homophobia was measured using an adaptation of four questions from Ross and Rosser's (1996) instrument, rated on a four-item Likert's scale (α=0.92) ranging from "strongly disagree" to "strongly agree". This short scale has been previously used in a similar population by Wong, et al. (2013). The items assessed the extent to which participants indicated disliking themselves for being sexually attracted to men, wished they were not sexually attracted to men, felt guilty for having sex with men, and felt stress or conflict as a result of having sex with men.

2.2.6. Drug use variables

Prescription drug misuse was defined as taking prescription drugs "when they were not prescribed for you or that you took only for the experience or feeling it caused" (SAMSHA, 2010). Participants were asked to respond to a Yes/No question asking if they misused prescription pain pills, tranquilizers, and/or stimulants. Participants were read a list

of the prescription drugs for each of drug classes noted above (e.g. Vicodin, OxyContin, Percocet, Valium, Xanax, Klonapin, Adderall, Ritalin, Vyvanse, etc.), and Yes/No question was asked for each drug on the list. To assess the severity of current prescription drug misuse for each class of drugs, participants were asked, "Approximately, how many pills (opioids/tranquilizers/stimulants) did you use in the past six months, that were not prescribed to you, or that you took only for the experience or feeling it caused?". Each of the three indicators of number of misused prescription drugs was skewed. Therefore, we used the median of each variable to classify participants into groups of “low” and “high” users of prescription drugs. For each drug type (opioid/tranquilizers/stimulants), a median number of misused prescription pills was calculated to classify participants as “low” or “high” users. We assessed use of illicit drug use in the past 6 months by asking participants whether they used ecstasy, mushrooms, γ-hydroxybutyric acid (GHB), lysergic acid diethylamide (LSD), heroin, cocaine, crack, PCP/angel dust, crystal methamphetamine, or ketamine. Alcohol and marijuana were excluded from the licit/illicit drug use categories given that both substances are readily available and commonly used within the general population of young adults. If they answered “Yes” to any, they were coded as 1="Yes" to illicit drug use, and if they answered “No” to all of them, they were coded as 0=”No”.

2.2.7. Sexual Risk Variables

The sexual risk variables used in this analysis included dichotomous measures assessing engagement in any unprotected anal intercourse, receptive or insertive, (UAI) in the preceding 180 days. UAI is the most commonly associated with HIV transmission in YMSM. Participants were asked, "In the last 6 months, how often did you use a condom during anal insertive/anal receptive"? Response options were 0=”never”, 1=”less than half the time”,

2=”half the time”, 3=”more than half the time”, 4=”always”. Values were dichotomized to 0 (used condoms all the time, during anal sexual acts, did not have unprotected anal sex) and 1 (did not use condoms all the time, during anal sexual acts, had unprotected anal sex). We also queried the total number of sexual partners (male, transgender, and female) during the past 180 days (continuous measure). The number of sex partners in the past 6 months was skewed, hence we used median number to divide participants into two groups of those having “low” and those having “high” number of sex partners. Unprotected anal intercourse in itself is not necessarily risky, for example if performed within a monogamous relationship, however given the highly transient nature of primary relationships at this age (Wong, et al., 2010), and in our sample (~10% reported being both currently monogamous and having only one partner in the past 6 months), we decided no to make distinction between inconsistent use of condoms with primary and non-primary partners.

2.3. Data Analysis

Descriptive statistics for all variables of interest, correlations between risk factors, and unadjusted bivariate associations between demographics, risk factors and drug use and sexual risk behaviors were examined using the Statistical Package for Social Sciences (SPSS) version 20.0. Next, hierarchical logistic regression models were used to examine how risk factors were associated with drug use and sexual risk behaviors after accounting for effects of statistically significant variables from the previous steps. For each outcome, independent variables associated at < 0.10 in bivariate analysis were retained in multivariate models. All independent continuous variables were mean-centered (Kraemer, & Blasey, 2004). Odds ratios (ORs), and 95% confidence intervals (CIs) were calculated. To prevent over-fitting the logistic regression model, collinearity between predictor variables was assessed using a

correlation matrix procedure. Variables were considered collinear if the value of the correlation coefficient was greater than 0.6 (Tabachnick, & Fidell, 2006). None of variables showed this level of collinearity. Hosmer and Lemeshow tests confirmed that the predictors were a good fit for each model. The explanatory power of the models estimating unprotected sex was estimated with Nagelkerke's R^2 (Nagelkereke, 1991).

Following procedures described by Baron and Kenny (1986), MacKinnon and Dwayer (1993), Shrout and Bloger (2002) and Wong, et al. (2010) on investigating mediated relationships with dichotomous outcomes, we evaluated a partially mediated model (where direct and indirect paths are specified) using weighted least squares-mean and variance adjusted (WLSMV) estimation. WLSMV is appropriate for models with binary variables (Muthen, & Muthen, 1998-2013). We used MPlus 7.1. to perform our path analysis, thus combining all the steps involved in the traditional modeling approach to simultaneously examine the direct, indirect, and total effects of the explanatory variables on our dependent variable (UAI or high number of partners in the past 3 months). Although drawing causal conclusions on the basis of these cross-sectional data is inappropriate, we established the theoretical order of the relations, or pathways, to the endogenous or dependent variable before analysis (Figure 1.). The final model presents coefficients associated with the hypothesized path between each explanatory variable and the mediation and outcome variables. Statistically significant coefficients with $p < 0.05$ suggest support for a hypothesized path in the model. The overall adequacy of the model was evaluated using comparative fit index (CFI), Tucker-Lewis index (TLI) and root mean-square error of approximation (RMSEA). Values approaching 0.95 are considered desirable for CFI and TLI (Hu, & Bentler, 1999). RMSEA values less than 0.06 indicated a close fitting model

(Ullman, & Bentler, 2004). Modification indices produced by Mplus were considered for inclusion in the model in order to increase model fit. Finally, given that a proposed mediator is dichotomous, we used bias-corrected bootstrap tests to estimate and test direct and indirect effects of our mediated model (Fritz, & MacKinnon, 2007; Shrout, & Bolger, 2002; Hayes, 2013).

3. Results

3.1. Descriptive findings

As summarized in Table 1, the average age was 23.74 (standard deviation, SD=3.29), with approximately equal number of participants in three age categories. The sample included 64 (33.5%) non-Hispanic Whites, and 127 (66.5%) racial minorities. Over half of sample self-identified as gay/homosexual (57.1%). Forty-four percent of the participants had a lifetime history of sexually transmitted infection (STI), while 15.7% were HIV-positive.

Table 1. Description of the study sample (N=191)

Variable	Categories	N (%)
Age (mean +/- SD)	Range: 18-29	23.74 (3.29)
Race	Non-Hispanic White	64 (33.5)
	Nonwhite:	127 (66.5)
	Black/African American	71 (37.2)
	Multiracial	35 (16.0)
	Other (incl. Hispanic)	17 (8.9)
	Asian/Pacific Islander	2 (1.0)
	Native American	2 (1.0)
Sexual Identity	Gay/Homosexual	109 (57.1)
	Bisexual/Heterosexual/Other	82 (42.9)
Lifetime Dx with STI		84 (44.0)
HIV +		30 (15.7)

Substantial proportions of participants reported experiences of the childhood abuse above minimal threshold (emotional 70.2%, physical 55.0%, sexual 49.2%) (see Table 2).

While the participants reported lower levels of experiences of discrimination or internalized homophobia, as indicated by the ranges, there was considerable variability around the mean, as indicated by the SDs. Levels of depression, anxiety, somatization and stress were relatively high. The most commonly misused prescription drug classes in the past 6 months were tranquilizers (80.6%) and opioids (78.5%), while slightly over half of the sample misused prescription stimulants (52.4%) and illicit drugs (56.5%).

Table 2. Descriptive statistics for observed indicators of risk factors (mental health burden, childhood abuse, victimization), prescription drug misuse, illicit drug use and unprotected sex (N=191)

Variable	Categories	Mean +/- SD	Range
Childhood Abuse	CTQ Emotional	13.14 (6.11)	5-25
	Above minimal threshold (N, %)	134 (70.2%)	
	CTQ Physical	9.99 (5.19)	5-25
	Above minimal threshold (N, %)	105 (55.0%)	
	CTQ Sexual (n=188)	8.63 (5.50)	5-25
	Above minimal threshold (N, %)	94 (49.2%)	
Victimization	Experience of homophobia	7.53 (4.27)	0-18
	Experience of racism (n=189)	2.92 (2.92)	0-12
	Experience of social racism/homophobia	2.52 (2.88)	0-12
	Internalized Homophobia (n=188)	5.35 (5.28)	0-16
Mental health burden	BSI Depression	66.77 (12.24)	44-80
	BSI Anxiety	66.47 (12.53)	41-80
	BSI Somatization	59.91 (12.33)	42-80
	Stress	20.89 (7.51)	3-40
Rx drug misuse in past 6 months	Opioids (N, %)	150 (78.5)	0-1
	Median # of misused opioid pills; IQR	(15; 2, 105)	0-2890
	Tranquilizers (N, %)	154 (80.6)	0-1
	Median # of misused tranquilizer pills; IQR	(12; 1, 96)	0-1800
	Stimulants (N, %)	100 (52.4)	0-1
	Median # of misused stimulant pills; IQR	(1; 0, 6)	0-850
Illicit drug use in past 6 months (N, %)		108 (56.5)	0-1
Unprotected Anal Intercourse (UAI)		102 (53.4)	0-1
Median # of sex partners; IQR		(5; 2, 10)	1-302

Finally, over half of participants reported engaging in UAI in the last 6 months (53.4%), while median number of sex partners in the past 6 months was 5 (IQR: 2, 10). Fourteen (7.3%) participants reported engaging in oral sex only with other men.

3.2. Bivariate-level associations

Table 3 presents associations between experiences of childhood abuse, sexuality and race identity related stressors and mental health burden. Associations among psychosocial variables were consistently significant. With exception of experiences of homophobia in relation to stress, experiences of social homophobia/racism in relation to somatization, and internalized homophobia in relation to experiences of sexual abuse or homophobia, they were all significant and positive.

Table 3. Associations between different risk factors (mental health burden, childhood abuse, victimization)

	1	2	3	4	5	6	7	8	9	10	11
Risk Factors											
1. BSI Depression	1.00	0.76***	0.53***	0.69***	0.42***	0.38***	0.30***	0.25***	0.25***	0.29**	0.39***
2. BSI Anxiety		1.00	0.56***	0.62***	0.37***	0.30***	0.25***	0.22***	0.26***	0.24***	0.33***
3. BSI Somatization			1.00	0.46***	0.37***	0.37***	0.26***	0.28***	0.23***	0.15*	0.21**
4. Stress				1.00	0.39***	0.39***	0.26***	0.18*	0.29***	0.20**	0.42***
5. CTQ Emotional					1.00	0.68***	0.52***	0.47***	0.31***	0.36***	0.31***
6. CTQ Physical						1.00	0.52***	0.42***	0.39***	0.36***	0.28***
7. CTQ Sexual							1.00	0.47***	0.31***	0.31***	0.17*
8. Homophobia								1.00	0.29***	0.45***	0.15*
9. Racism									1.00	0.36***	0.21**
10. Social Homophobia/Racism										1.00	0.26***
11. Internalized Homophobia											1.00

† < 0.1; * <0.05; ** <0.01; * <0.001**

In Table 4, we present bivariate associations between demographics, experiences of childhood abuse, sexuality and race identity related stressors, mental health burden and outcome variables of interest. With exception of stimulants misuse, older participants were significantly more likely to engage in drug use and risky sexual behaviors (p values ranged

from ≤ 0.1 to ≤ 0.001). Non-Hispanic White YMSM were significantly more likely to engage in stimulants misuse ($p \leq 0.001$) and illicit drug use ($p \leq 0.05$) compared to non-White YMSM. Non-gay identified YMSM were significantly more likely to misuse prescription opioids and tranquilizers (both $p \leq 0.001$), or use illicit drugs ($p \leq 0.05$), but were less likely to engage in UAI ($p \leq 0.05$). Having history of STI diagnosis was significant predictor of high misuse of prescription tranquilizers ($p \leq 0.01$), illicit drug use ($p \leq 0.01$), engaging in UAI ($p \leq 0.1$) and having a high number of partners ($p \leq 0.1$). Those who reported being HIV+ were more likely to use illicit drugs ($p \leq 0.05$) and have higher number of partners ($p \leq 0.1$).

Among stressors, all 3 forms of childhood abuse were significantly associated with misuse of prescription opioids ($p \leq 0.001$, except sexual abuse – $p \leq 0.01$), prescription tranquilizers ($p \leq 0.01$) and high number of sex partners ($p \leq 0.05$). Those who were emotionally abused were somewhat more likely to use illicit drugs ($p \leq 0.1$), while those who were physically abused were somewhat less likely to misuse stimulants ($p \leq 0.1$). While there were no effect of high experiences of homophobia on drug use (except for tranquilizers, $p \leq 0.1$), or risky sexual behaviors (except for UAI, $p \leq 0.1$), high experiences of racism were associated with higher use of opioids ($p \leq 0.01$), tranquilizers ($p \leq 0.05$), illicit drugs ($p \leq 0.01$) and high number of sexual partners ($p \leq 0.05$). Higher experiences of social homophobia/racism were significantly associated with misuse of prescription tranquilizers ($p \leq 0.001$), UAI ($p \leq 0.05$) and higher number of sex partners ($p \leq 0.1$). However, these experiences were associated lower likelihood of stimulant misuse ($p \leq 0.1$). Internalized homophobia was associated with higher misuse of opioids and tranquilizers ($p \leq 0.001$), and use of illicit drugs ($p \leq 0.05$). Higher levels of depression, anxiety, somatization and stress

were strongly associated with higher opioid ($p \leq 0.001$), and tranquilizer (p vales ranged from $p \leq 0.05$ to $p \leq 0.001$) misuse. High levels of stress were indicator of lower stimulant misuse ($p \leq 0.1$). Illicit drug use was associated with high levels of depressive and somatization symptoms ($p \leq 0.05$ and $p \leq 0.01$, respectively). Finally, higher number of sex partners was significantly associated with high level of depression ($p \leq 0.05$), and approached significance for high level of anxiety ($p \leq 0.1$).

In addition, high prescription opioids misuse was significantly associated with high prescription tranquilizers misuse ($p \leq 0.001$), illicit drug use ($p \leq 0.001$) and higher number of sex partners ($p \leq 0.05$). Illicit drug use was also significantly associated with high prescription tranquilizers, prescription stimulants and high number of sex partners (each $p \leq 0.001$).

Table 4. Bivariate associations between demographics, risk factors and drug use and sexual risk behaviors in the past 6 months. n=191

		Rx Opioids (high use; >median)	Rx Tranquilizers (high use; >median)	Rx Stimulants (high use; >median)	Illicit drugs use	UAI	Sex Partners (high #; >median)
Demographics		n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Age group	18-21	18 (19.1)	17 (18.3)	27 (29.7)	27 (25.0)	25 (24.5)	24 (29.3)
	22-25	33 (35.1)	33 (35.5)	33 (36.3)	36 (33.3)	36 (35.3)	21 (25.6)
	26-29	43 (45.7)***	43 (46.2)***	31 (34.1)	45 (41.7)*	41 (40.2)†	37 (45.1)*
Race	non-White	60 (63.8)	62 (66.7)	48 (52.7)*** (-)	64 (59.3)*(-)	65 (63.7)	52 (63.4)
Sex ID	non-Gay	53 (56.4)***	53 (57.0)***	42 (46.2)	54 (50.0)*	36 (35.3)*****	39 (47.6)
Dx with STI	Yes	42 (44.7)	50 (53.8)**	41 (45.1)	57 (52.8)**	51 (50.0)†	42 (51.2)†
HIV +		17 (18.1)	16 (17.2)	16 (17.6)	22 (20.4)*	20 (19.6)	17 (20.7)†
Risk factors		M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)
CTQ Emotional		14.67 (6.32)***	14.42 (6.24)**	12.83 (6.11)	13.80 (6.10)†	13.17 (6.16)	14.40 (6.46)*
CTQ Physical		11.50 (5.65)***	11.09 (5.45)**	9.26 (5.08)† **(-)**	10.22 (4.97)	10.09 (5.27)	10.90 (5.73)*
CTQ Sexual		9.79 (5.89)**	9.82 (5.64)**	8.91 (5.36)	8.98 (5.23)	8.62 (5.08)	9.58 (6.18)*
Homophobia		7.98 (4.81)	8.03 (4.59)†	7.31 (4.34)	7.68 (4.39)	8.02 (4.30)†	7.94 (4.28)
Racism		3.54 (3.20)**	3.37 (3.06)*	2.71 (2.96)	3.42 (3.15)**	2.96 (3.07)	3.49 (3.14)*
Social Homoph/Racism		2.80 (3.00)	3.28 (3.09)***	2.15 (2.87)† (-)	2.77 (2.77)	2.93 (3.06)*	2.94 (2.97)†
Intern. Homophobia		6.69 (5.56)***	7.23 (5.34)***	4.97 (5.13)	6.07 (5.03**)***	5.17 (5.00)	5.95 (5.34)
BSI Depression		70.77 (11.27)***	70.77 (10.59)***	65.64 (13.27)	68.73 (11.54)*	66.29 (12.03)	68.95 (11.62)*
BSI Anxiety		69.66 (12.08)***	69.98 (11.88)***	65.90 (12.70)	67.94 (11.65)	66.58 (12.40)	68.17 (11.34)†
BSI Somatization		63.48 (12.17)***	61.71 (12.83)*	60.67 (12.37)	62.23 (11.81)**	60.50 (11.91)	60.89 (12.19)
Stress		23.52 (7.57)***	23.38 (6.75)***	19.95 (8.48)**†(-)**	21.71 (7.86)	20.44 (7.62)	21.89 (8.12)

Drug and sex risk	n (%)	n (%)	n (%)	n (%)	n (%)
Rx Opioids					
Rx Tranquilizers	74 (79.6)***				
Rx Stimulants	50 (54.9)	47 (51.6)			
Illicit drug use	68 (72.3)***	66 (71.0)***	63 (69.2)***		
UAI	52 (55.3)	50 (53.8)	47 (51.6)	61 (56.5)	
# of sex partners	47 (50.0)*	45 (48.4)	37 (40.7)	58 (53.7)***	49 (48.0)

† **< 0.1;** * **<0.05;** ** **<0.01;** *** **<0.001**

3.3. Multi-level associations

Table 5 presents results from hierarchical logistic regression models. We present estimates of the adjusted odds ratios (AOR) for our outcomes of interests as a function of adverse childhood events, experiences of discrimination, internalized homophobia and mental health burden after controlling for demographic factors. After controlling for other significant effects of covariates at each step, childhood physical abuse (OR=1.12, 95% CI [1.01, 1.25]; $p < 0.05$) was the most significant risk predictors of high misuse of prescription opioids. Additionally stress (OR=1.06, 95% CI [0.99, 1.15]; $p = 0.1$) was nearly significant predictor of high opioid misuse. Childhood sexual abuse was the most significant predictor of high misuse of tranquilizers (OR=1.13, 95% CI [1.02, 1.24]; $p < 0.05$), while experiences of racism were significantly associated with lesser use of prescription tranquilizers (OR=0.80, 95% CI [0.67, 0.94]; $p < 0.01$). However, additional post hoc analyses conducted to test for possible interactive effects between race and the experiences of racism revealed that this finding is nearly significant for racial minority participants only (Wald=3.43, p=0.06). In the model predicting use of illicit drugs in the past 6 months, having experienced racism was actually positively associated with the outcome (OR=1.13, 95% CI [0.99, 1.28]; $p < 0.1$). The post hoc analysis indicated that the interaction term for racial minority and illicit drug use was not significant. In the same model, higher levels of somatization were associated with illicit drug use (OR=1.03, 95% CI [1.00, 1.06]; $p < 0.1$). In models predicting UAI and high number of sex partners, no risk factor of interest was significantly associated with outcomes of interest after controlling for socio-demographic variables.

Table 5. Hierarchical Logistic Regression analyses of risk factors of Rx and Illicit Drug Use and Number of Sex partners

		Rx Opioids (OR, 95% CI)	Rx Tranquilizers (OR, 95% CI)	Rx Stimulants (OR, 95% CI)	Illicit drugs use (OR, 95% CI)	UAI (OR, 95% CI)	# of Sex Partners (OR, 95% CI)
Steps							
1. Sociodemographics							
Age	18-21	1.00	1.00	-	1.00	1.00	1.00
	22-25	4.06 (1.55-10.63)**	3.90 (1.43-10.67)**	-	0.97 (0.43-2.19)	1.85 (0.86-3.97)	0.63 (0.28-1.39)
	26-29	9.25 (3.38-25.35)***	5.51 (1.89-16.01)***	-	1.66 (0.71-3.90)	2.42 (1.07-5.47)*	2.07 (0.95-4.52)
Race	non-White	-	-	0.34 (0.17-0.67)**	0.37 (0.18-0.79)**		-
Sex ID	non-Gay	2.50 (1.12-5.59)*	4.50 (1.81-11.17)**	-	1.34 (0.65-2.79)	0.44 (0.24-0.82)**	-
Dx with STI	Yes	-	2.09 (0.94-4.63)†	-	2.00 (0.98-4.09)†	1.47 (0.78-2.78)	1.60 (0.80-3.21)
HIV +		-	-	-	1.50 (0.55-4.11)		1.11 (0.44-2.80)
Risk factors							
2. Abuse							
CTQ Emotional		0.98 (0.90-1.06)	0.95 (0.87-1.04)	-	-	-	1.02 (0.94-1.09)
CTQ Physical		1.12 (1.01-1.25)*	1.06 (0.94-1.18)	0.99 (0.93-1.06)	-	-	0.99 (0.93-1.11)
CTQ Sexual		1.06 (0.97-1.16)	1.13 (1.02-1.24)*	-	-	-	1.04 (0.91-1.12)
3. Discrimination							
Homophobia		-	1.02 (0.92-1.14)	-	-	1.05 (0.97-1.13)	-
Racism		0.89 (0.76-1.03)	0.80 (0.67-0.94)**	-	1.13 (0.99-1.28)†	-	1.07 (0.95-1.21)
Social Homophobia/Racism		-	1.15 (0.96-1.36)	0.98 (0.87-1.10)	-	1.05 (0.93-1.19)	0.96 (0.65-1.10)
4. Internalized Homophobia		0.99 (0.91-1.07)	1.03 (0.95-1.12)	-	1.01 (0.94-1.08)	-	-
5. Mental Health Burden							
BSI Depression		1.03 (0.98-1.08)	1.04 (0.98-1.09)	-	1.01 (0.98-1.05)	-	1.02 (0.98-1.06)
BSI Anxiety		0.98 (0.94-1.03)	1.01 (0.96-1.05)	-	-	-	1.00 (0.96-1.04)
BSI Somatization		1.03 (0.99-1.07)	0.98 (0.95-1.02)	-	1.03 (1.00-1.06)†	-	-
Stress		1.06 (0.99-1.15)†	1.06 (0.98-1.15)	0.97 (0.93-1.02)	-	-	-
		$\chi^2(12)=61.6$*** $R^2=0.40$ HL(8)=ns	$\chi^2(15)=72.0$*** $R^2=0.46$ HL(8)=ns	$\chi^2(4)=16.96$** $R^2=0.12$ HL(8)=ns	$\chi^2(10)=34.0$*** $R^2=0.23$ HL(8)=ns	$\chi^2(6)=18.2$** $R^2=0.12$ HL(8)=ns	$\chi^2(11)=20.6$* $R^2=0.14$ HL(8)=ns

† < **0.1;** * **<0.05;** ** **<0.01;** *** **<0.001**

3.4. Mediation findings

On the basis of the findings from bivariate analysis and regression analysis, we examined a path model for a high number of sex partners for each potential mediator. While results from bivariate analysis indicated that prescription opioids misuse and illicit drug misuse were significantly associated with increased number of sex partners, prescription tranquilizers and stimulants were not, suggesting that these two classes of prescription drugs may not be a feasible mediators of the path between different stressors, mental health burden and having a high number of sexual partners. Further, no prescription drug misuse or illicit drug use was associated with UAI, hence these paths were not further investigated. In addition, there was no direct relationship between some of variables that predicted prescription opioid misuse or illicit drug use and increased number of partners. However, following the modern thinking of intervening variable models which do not impose the requirement that there be evidence of a simple association between predictor and outcome in order to estimate and test hypotheses about indirect effects (Hayes, 2009), we decided to investigate path models including these predictors as well.

The path analysis (Figure 2) examining whether prescription opioids misuse and illicit drug use mediated the association between stressors and high number of sexual partners appeared to be an adequate fit for the data (CFI = 0.99; RMSEA = 0.006; TLI = 0.99). Higher probability of prescription opioids misuse was significantly associated with experiencing physical abuse (b=0.06, 95% CI [0.02, 0.10]; $p < 0.01$), stress (b=0.03, 95% CI [0.00, 0.06]; p= 0.05), being older (b=0.82, 95% CI [0.45, 1.20]; $p < 0.001$), and not identifying as gay/homosexual (b=0.43, 95% CI [0.06, 0.10]; p= 0.05). Note that for this analysis age was categorized as binary variable based on median age of the sample, i.e.

"younger" vs. "older". Significant paths leading to higher probability of illicit drugs use included somatization (b= 0.02, 95% CI [0.01, 0.04], $p < 0.05$), experiences of racism (b= 0.11, 95% CI [0.03, 0.18], $p < 0.05$), lifetime diagnosis of STI (b= 0.48, 95% CI [0.12, 0.85], $p < 0.05$). Significant path leading to lower use of illicit drugs included being racial minority (b= -0.54, 95% CI [-0.93, -0.15], $p < 0.05$). Finally, illicit drug use predicted greater probability of high number of sex partners (b= 0.30, 95% CI [0.08, 0.51], $p < 0.05$). In the same model, we also observed a strong association between high misuse of prescription opioids and illicit drug use (b= 0.39, 95% CI [0.20, 0.58], $p = 0.001$). Tests of indirect effects using the bias-corrected bootstrap method revealed no significant association between specific stressors and higher number of sex partners via higher prescription opioids misuse. However, we observed a number of the indirect effect of stressors on high number of sex partners via illicit drug use. These included somatization (b= 0.03, $p < 0.01$), experiencing racism (b= 0.05, $p < 0.05$), lifetime diagnosis of STI (b= 0.19, $p < 0.05$), and race (b= - 0.18, $p = 0.05$).

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(b= -0.54, 95% CI [-0.93, -0.15], p < 0.05). Finally, illicit drug use predicted greater probability of high number of sex partners (b= 0.30, 95% CI [0.08, 0.51], p < 0.05). In the same model, we also observed a strong association between high misuse of prescription opioids and illicit drug use (b= 0.39, 95% CI [0.20, 0.58], p = 0.001). Tests of indirect effects using the bias-corrected bootstrap method revealed no significant association between specific stressors and higher number of sex partners via higher prescription opioids misuse. However, we observed a number of the indirect effect of stressors on high number of sex partners via illicit drug use. These included somatization (b= 0.03, p < 0.01), experiencing racism (b= 0.05, p < 0.05), lifetime diagnosis of STI (b= 0.19, p < 0.05), and race (b= - 0.18, p = 0.05).

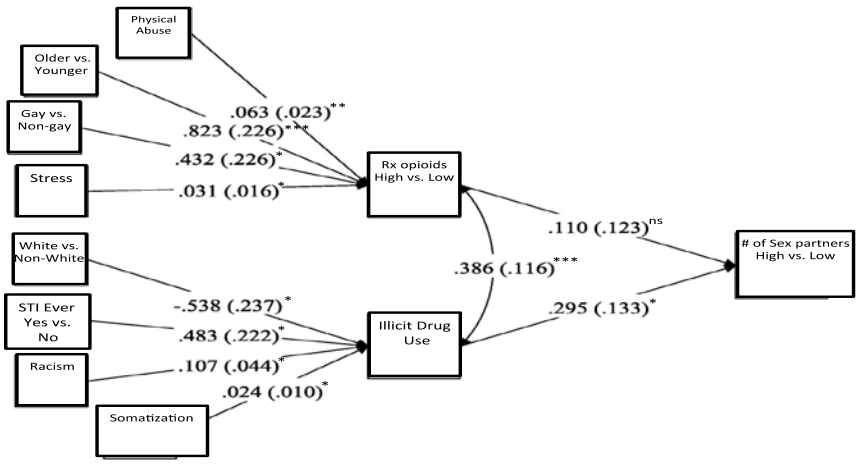

Figure 2. Estimated path model linking stressor and demographic variables to substance use and high number of sex partners.

4. Discussion

The current study is among the first to present an analysis of multiple, interrelated, risk factors associated with prescription drug misuse, illicit drug use, and sexual risk behaviors among YMSM. Consistent with previous research, and conceptual framework presented in Figure 1 (Meyer, 2003; Wong, et al., 2010; Fields, Malebranche, & Feist-Price, 2008) experiences of childhood abuse, and discrimination were significantly associated with participants' level of mental health distress. The results of the present study provide evidence that YMSM who misuse higher quantities of prescription opioids and prescription tranquilizers experience a number of adverse factors in their lives. Relationship of these risk factors with higher stimulant misuse was less robust. Consistent with theoretical framework, experiences of abuse, discrimination, and mental health problems also play role in illicit drug use and sexual risk behaviors. However, relationship between stressors and sexual risk behaviors appear to be complex, as some of these associations appear to be mediated by substance use, in particular by illicit drug use.

In previous studies, childhood abuse was found to be associated with depression, attempted suicide, gay-related victimization, and engagement in substance use and high-risk sex among YMSM (Bontempo, & D'Augelli 2002; Rosario, Schrimshaw, & Hunter, 2006; Friedman, et al., 2008). Significantly elevated rates of all three forms of childhood abuse have been reported by YMSM in this study as well, with over half of the sample reporting physical abuse and nearly half reporting sexual abuse in their childhood. Previous research explains these high rates of childhood abuse among YMSM as related to insufficient family and peer support during sexual identity development (Relf, 2001), or to gender nonconformity (Harry, 1989). In bivariate analysis, childhood abuse was significantly

associated with mental health distress. All three forms of abuse were also significantly associated with increased opioid and tranquilizer misuse as well as having a higher number of sexual partners. It is possible that prescription opioids and tranquilizers may serve as an avenue to cope or dissociate from the pain, anxiety, and anger that may accompany these experiences (Bensley, Spieker, Van Eenwyk, & Schoder, 1999; Dube, Felitti, Dong, et al. 2003). Furthermore, after controlling for other variables, physical abuse remained associated with increased opioid misuse, while sexual abuse remained associated with increased tranquilizer misuse. This supports previous findings that use of depressant drugs, such as opiates and tranquilizers, is more often reported in childhood abuse victims (Harrison, Hoffman & Edwall, 1989; Heffernan, et al., 2000). While previous research has found that history of childhood abuse is significantly associated with UAI among YMSM (Rosario, Schrimshaw, & Hunter, 2006; Mimiaga, et al. 2009), we were unable to confirm this relationship.

Consistent with previous research (Meyer, 2003; Cochran, Sullivan, & Mays, 2003; Wong, et al., 2013), experiences of racism, social racism, and homophobia among our participants were significantly associated in the bivariate analysis with higher levels of mental health distress. These types of stressors may represent vulnerabilities for the subsequent development of mental health problems among YMSM (Stall, Friedman, & Catania, 2008). Previous research found that experiences of homophobia, racism, and/or social homophobia/racism lead to discomfort with one's sexual identity and may act as a significant psychosocial stressor linked to increased sexual risk taking (Johnson, et al., 2008; Mizuno, et al., 2012) or to substance use disorders (McCabe, et al., 2010). We also observed some associations of these stressors and substance use and sexual risk behaviors in bivariate

analysis. For example, greater experiences of homophobia and social racism/homophobia were significantly associated with UAI among YMSM in this study sample. However, once other effects were considered, these experiences of discrimination were no longer significant predictors of drug use and risky sexual behavior. Furthermore, in multivariate model for high tranquilizer misuse, we observed protective effect of racism experiences. Additional analyses indicated that the effects of racism on tranquilizers misuse differed between Whites and racial minorities, such as that high tranquilizer misuse in racial minority YMSM cannot be explained by experiences of racial discrimination. In bivariate analysis, YMSM with higher levels of internalized homophobia were more likely to report higher levels of prescription opioids and tranquilizers misuse, as well as illicit drug use, but these associations were not held in multivariate models examining high levels of prescription drug misuse or illicit drug use, similar to Thiede et al. (2003). Unlike other studies that found that YMSM with positive attitudes about homosexuality are less likely to have multiple sex partners and less likely to engage in UAI (Rosario, Schrimshaw, & Hunter, 2006), we did not observe any differences.

Levels of depression, anxiety, and somatization were quite high, but we caution against interpreting these values against the clinical case cutoff values in this population (Mustanski, Garofalo, & Emerson, 2010). Mental health distress was significantly associated with higher opioids and tranquilizers misuse, and associated with illicit drug use in some cases (depression and somatization) and increased number of sex partners (depression and anxiety) at the bivariate level. However, in the more stringent predictive multivariate models, mental health stress was no longer a significant predictor of these behaviors, with exception of stress for prescription opioids and somatization for illicit drugs. Individuals may use opioids to self-medicate undifferentiated states of physical or mental pain (Sullivan et al.,

2006). Since opioids provide general calming and normalizing effect (Khantzian, 1997), participants suffering from higher stress may use them to escape from their current stressful state. While there was no association between higher levels of mental health distress and sexual risk behaviors in multivariate models, our additional analyses indicate possible mediation impact of drug use on sexual risk behaviors. This is in line with previous research that indicates combined effects of drug use and mental health burden on sexual risk behaviors among YMSM (Stall, et al., 2003; Mustanski, et al., 2007; Halkitis, et al., 2013).

Previous research has linked illicit drug use with UAI and increased number of sex partners in this population (Stall, & Purcell, 2000). Illicit drug use significantly predicted higher number of sex partners in this study as well. Previous research has also linked prescription drug misuse with risky sexual behavior (Bentosch, et al., 2011a; Bentosch, et al., 2011b; Kelly, & Parsons, 2011) among young adults and among MSM. In our analysis higher prescription opioid misuse was associated with higher number of sex partners in bivariate analysis, it did not significantly mediated effects of risk factors on increased number of sex partners. However, high prescription opioid misuse was associated with illicit drug use, which significantly mediated effect of somatization, racism, and history of STI. Hence, prescription opioid misuse might mediate effect of stressors in conjunction with illicit drug use. Further, prescription drug misuse might mediate other psychosocial processes not examined in this study.

We also examined whether certain demographic subgroups of YMSM were more likely to be at risk than others. In multivariate models, older YMSM were more likely to experience higher prescription opioid and tranquilizer misuse, as well as more likely to engage in UAI. However, there was no difference between age categories with higher

prescription stimulant misuse, illicit drug use or increased number of sex partners. Possible explanations include that older YMSM have an easier access to settings where opioids and tranquilizers are available, or that the sexual networks of older YMSM place them at greater risk for UAI than the sexual networks of young YMSM. Those YMSM who identified as bisexual, heterosexual, or other were at considerable risk for at two out of four drug outcomes. For these youth, having sex with men is likely to be at odds with their sexual identities (Gwadz, 2004), therefore high prescription opioid and tranquilizer misuse may represent a maladaptive coping mechanism for managing negative self-directed feelings about sexual identity. However, in our multivariate model internalized homophobia was not a significant predictor of higher tranquilizer misuse. Somewhat expectedly, non-gay/homosexual identified individuals were less likely to engage in UAI. This confirms previous finding that YMSM who did not disclose their sexual orientation to others were significantly less likely than disclosers to engage in UAI (CDC, 2003). There were some notable racial differences predicting higher misuse of prescription drug subtypes. Interestingly, we did not observe any racial difference for high misuse of prescription opioids or tranquilizers. However, we observed that racial minority YMSM were significantly less likely than white YMSM to misuse higher quantities of stimulants or to use illicit drugs confirming some of the previous findings (McCabe, Boyd, & Teter, 2009; Bavarian, Flay, Ketcham, & Smit, 2013; Wong, et al., 2010; Kipke, Weiss, & Wong, 2007; Thiede, et al., 2003).

Our findings have important implications for future research and interventions aimed at reducing health risks in this population. For researchers, prescription drug misuse is another important factor to consider when investigating substance use and sexual risk

behaviors. Additional research with other YMSM communities, as well as longitudinal studies are needed to investigate causal paths and stability of these findings over the time. It is likely that there are other factors to be considered in addition to concomitant risk factors such as childhood abuse, discrimination, and mental health problems. Some evidence has suggested the salience of personality factors to understanding substance use and sexual risk taking (Dudley, Rostosky, Korfhage, & Zimmerman, 2004). Specifically, sexual risk behavior has been found to be associated with impulsivity (Semple, Patterson, & Grant, 2000; Dudley, et al., 2004), sexual compulsivity (Parsons, Grov, & Golub, 2012) and sensation seeking (Ostrow, DiFranceisco, & Kalichman, 1997; Newcomb et al., 2010). Future research investigating prescription drug misuse among YMSM should attempt to address these factors as well. In addition, qualitative studies involving YMSM may further elucidate the contexts in which experiences of mistreatment and discrimination occur and may offer more concrete insight into phenomena of prescription drug misuse.

For practitioners, our findings emphasize the importance of recognizing the patterns of interrelated risk factors that contribute to substance use and unsafe sexual practices among YMSM. HIV risk-reduction and prevention strategies need to be multifaceted, targeting multiple psychosocial factors as well as substance abuse. Besides including efforts to promote personal skills such as using condoms and behavioral self-management, these results indicate that including strategies for coping with negative life experiences merits a strong consideration in development and delivery of new behavioral interventions for YMSM.

We acknowledge a number of study limitations. Although self-reported data on risky behaviors and substance use are generally considered valid (Ford, 2008), self-report surveys could introduce various forms of bias including recall bias, pressure to give desirable

answers, and non-response bias. Use of computer assisted interview technology likely minimized the bias of underreporting or socially desirable responding. While findings from this study provide some insight into psychological risk factors for prescription drug misuse, the cross-sectional analysis does not allow for inference about the temporal association between depression, anxiety, somatization or stress, and prescription drug misuse and sexual risk behavior. Although our sampling plan intended to capture maximum diversity in this population, much of which is hidden, we cannot make claims regarding the generalizability of these findings to the larger population of YMSM. Therefore, these results may not generalize to YMSM who do not engage in substance use behaviors, do not engage in risky sexual behaviors, or do not live in Philadelphia area. This analysis does not adjust for other potential covariates that might be associated with substance use or sexual risk behaviors, such as peer influence (Stein, et al., 2005), or social network characteristics (Kapadia, Siconolfi, Barton, et al., 2013). Statistical power limitations prevented us from testing additional potential covariates, or testing separate models for different demographic characteristics. Lack of power could also account for some non-significant findings.

In conclusion, our findings corroborate other studies that link contextual stress with substance use among YMSM (Wong, et al., 2010). YMSM who are exposed to childhood abuse may be at particular risk for prescription opioid and tranquilizer misuse later in life as a means of avoidance or alleviation of distress from earlier victimization. In this analysis we differentiated between subtypes of prescription drug misuse since they are likely to be associated with different risk factors. Results suggest that combination of prescription drug misuse, in particular prescription opioids, and illicit drug use is associated with some sexual risk behavior, i.e. increased number of partners. This is consistent with Ryan et al., (1999)

finding that only having a history of both alcohol and other substance use disorder conveyed additional risk; the multiplicity of problems indicates greater sexual risk behaviors. Finally, our findings suggest that interventions aimed at YMSM who misuse prescription drugs may need to be targeted at broader problems such as childhood abuse, discrimination, or mental health if they seek to reduce YMSM's risk behaviors.

Chapter 4. Motivations for prescription drug misuse among young men who have sex with men (YMSM) in Philadelphia

Abstract:

Background: Prescription drug misuse (i.e. opioids, tranquilizers and stimulants) has become the fastest growing area of substance abuse among young adults. However, there is a lack of literature that focuses specifically on prescription drug misuse among young men who have sex with men (YMSM, aged 18-29). Furthermore, little is known about motives of YMSM and what may bring them to turn to the misuse of prescription pills. The purpose of this study was to explore personal motivations for prescription drug misuse among YMSM, including the possible connection between misuse and sexual behaviors.

Methods: Semi-structured qualitative interviews were conducted with twenty-five YMSM, recruited in Philadelphia from November 2012 to July 2013, who misused prescription drugs in the past 6 months. Thematic analysis of qualitative data was conducted using Atlas.ti.

Results: While we found overlap with previous literature on motives for misuse of prescription drugs, our data yielded some distinct motivations specific for YMSM. Commonly cited motives for misuse of prescription drugs included social/recreational motives, facilitating sex with other men, and psychological motives such as stress management or escapism from everyday hardships (prescription opioids and tranquilizers) or feeling more energized (prescription stimulants).

Conclusions: Our findings offer insights in YMSM's motivations for prescription drug misuse. Results support the need for developing prevention messages specific to a prescription drug misuse among YMSM.

1. Introduction

Prescription drug misuse, defined as use of prescription drugs not as prescribed, or use when not prescribed (Hernandez, & Nelson, 2010) is an important public health concern as it is the fastest growing area of substance abuse among adolescents and young adults (Substance Abuse and Mental Health Services Administration, SAMSHA, 2010; Berenson, & Rahman, 2011). Recent data indicate that 20.4% of the US population has misused at least one of the three prescription drug classes (pain relievers, tranquilizers, and stimulants) during their lifetime and 6.3% misused in the past year (SAMHSA, 2010). The highest rate of misuse in the past year (14.3%) was reported among young adults aged 18-25 years (SAMHSA, 2010). Much of data on prescriptions drug misuse among young adults is largely limited to the heterosexual college population (McCabe, West, & Wechsler, 2007; Aria et al., 2008), with limited knowledge on prescription drug misuse among LGBT adolescents (Corliss, et al., 2010), and men who have sex with men (MSM) (Kelly, & Parsons, 2010; Benotsch, et al., 2011).

One key to understanding a behavior is to examine the causes, reasons, or intentions that move individuals to perform certain actions, including substance use (DiClemente, 1999; Ferster et al., 1997). To develop appropriate prevention strategies, researchers need to understand different populations of prescription drug misusers (Zacny, et al., 2003), including their motivations for misuse. The role of motives in prescription drug misuse has been investigated in prior quantitative (Carey, & Correia, 1997; Redman, 2010; Boyd, McCabe, Cranford, & Young, 2006; McCabe, Boyd, & Teter, 2009) and qualitative (Bardhi, Sifaneck, Johnson, & Dunlap, 2007; Quintero, Peterson, & Young, 2006; Quintero, 2009; Silva, Kecojevic, & Lankenau, 2013) studies.

Based on motives for misuse of prescription drugs, quantitative researchers have identified categories of misusers as self-treatment, recreational, and mixed motive misusers (McCabe, et al., 2007). Additionally, qualitative studies report social motives (Quintero, 2009) or quasi-medical (Quintero, Peterson, & Young, 2006). The most commonly cited reasons for misuse of prescription opioids include self-medicating to relive pain, getting high, relaxing, or to experiment (McCabe, Cranford, Boyd, & Teter, 2007; McCabe, West, & Boyd, 2013; McCabe, & Cranford, 2012; Zachny, & Lichtor, 2008). Tranquilizers or benzodiazapines are often misused for their therapeutic indication, i.e. anxiety (Fatseas, Lavie, Denis, & Auriacombe, 2009), but also for recreational, "party", and thrill-seeking behaviors (O'Brien, 2005; Stone, & Merlo, 2011; Fatseas, et al., 2009). A number of different motives were cited for prescription stimulant misuse such as: enhancing academic achievement (Stein, 2012; Arria, et al., 2013; Rabiner, Anastopoulos, & Costello, 2009), weight loss (Jeffers, Benotsch, & Koester, 2013), reducing fatigue (White, Becker-Blease, & Grace-Bishop, 2006), or experimenting (McCabe, & Cranford, 2012). These studies investigated motivations for prescription drug misuse among adolescents, college students and high-risk populations, such as injection drug users.

The study by Benotsch, et al. (2011), explored motivations for non-medical use of prescription drugs among MSM attending gay pride festival. Participants reported multiple motivations, ranging from pain relief to more experimental motivations (i.e.. "getting high"). Previous studies that examined motives for use of erectile dysfunction drugs (EDD) among MSM found that the most common reasons were to "add to the fun", "maintain an erection while using a condom" and "to have sex for hours" (Pantalone, Bimbi, & Parsons, 2007). However, no study has examined motives for prescription drug misuse among young men

who have sex with men (YMSM), although they tend to have higher rates of drug use than their heterosexual peers (Cochran, et al., 2004; Ostrow, & Stall, 2008), or older MSM (Greenwood, et al., 2001). Understanding YMSM's motivations for misusing prescription drugs is necessary to inform public health campaigns geared toward this population, particularly as motivations for misuse that were derived from other populations may not be valid for YMSM. Furthermore, literature suggests that substance use, among other characteristics, may play an important role in high-risk sexual behaviors. For example, the use of drugs is one of the primary risk factors associated with HIV infection including unprotected anal intercourse (UAI) and having multiple sex partners (Colfax, et al., 2004; Koblin, et al., 2003; Mansergh, et al., 2006).

Overall, there is a paucity of data on the motivations for drug use among YMSM despite the high prevalence of the substance abuse in this population. Prior quantitative studies on popular club drugs among MSM, such as ecstasy, methamphetamine, cocaine, and gamma-hydroxybutyrate (GHB), have identified specific functions and motives related to socializing (Green, 2003; McDowell, 2000), energy boost, sleep assistance, and/or increase in libido (Palamar, & Halkitis, 2006), enhancing sexual experiences (Semple, Patterson, & Grant, 2002; Halkitis, Fischgrund, & Parsons, 2005), or self-medication of negative affect associated with HIV status (Semple, et al., 2002). These drugs are often used in the context of nightclubs and bars (Halkitis, & Parsons, 2002), with younger men more likely to use them for social reasons (Halkitis, Fischgrund, & Parsons, 2005). A qualitative study on motivations for club drug use in a sample of seroconverted and seronegative gay and bisexual men in New York City (Jerome, Halkitis, & Scionolfi, 2009) revealed seven recurring subthemes that fall within three larger domains: physical, emotional/mental, and social.

Another qualitative study of 16 Latino drug-using gay men San Francisco found that participants used drugs to cope with sexual identity, to feel like part of the mainstream gay community, and to reduce sexual inhibitions (Bauermeister, 2007). Since it is likely that prescription drug misuse occurs in combination with, or as substitutes for club drugs (Iniciardi, Surrat, Kurtz, et al., 2007), some of the same motivations may be shared.

At the start of this study, we were interested in learning whether motivations for misuse of prescription drugs were related to sexual behaviors of YMSM. Therefore, the goal of this study is to identify, describe, and analyze the motives for and meanings of prescription drug (i.e. pain pill, tranquilizer, stimulant) misuse among a sample of YMSM in Philadelphia. In particular, we sought to determine whether there are particular motivations for prescription drug misuse that are unique to YMSM.

2. Methods

The study utilizes both quantitative survey data (e.g. frequencies and percentages), to describe broader patterns found within a study sample, and qualitative data, i.e., narrative accounts, to provide contextualized details as reported by individual participants. This mixed method approach has been used previously to describe risk behaviors and patterns of substance use among smaller samples of young adults (Lankenau et al., 2012; Silva, et al., 2013) and MSM (Semple, et al., 2002).

2.1. Interview Participants and Procedures

Semi-structured qualitative interviews were conducted with 25 YMSM who misused prescription drugs in the past 6 months. Participants were selected from a larger cross-sectional sample of prescription drug misusing YMSM, recruited from November of 2012 to July of 2013 (n=191) in Philadelphia (Kecojevic, et al., 2014). The eligibility criteria for the

survey component included: age 18 to 29, misuse of at least one prescription drug class in the previous six month, having sex (oral or anal) with at least one male partner in the prior six months, residing in Philadelphia metro area (determined upon participants' primary residence zip code), and English-speaking. Nonmedical use or prescription drug misuse was assessed as, "In the last 6 months, have you, even once, used any of the following (pain pills, tranquilizers, stimulants) when they were not prescribed for you or that you took only for the experience or feeling it caused?" Recruitment involved active and passive distribution of fliers and study cards at nightclubs, coffee houses, LGBT youth organizations, social service agencies, craigslist.com, college campuses, and street and park locations commonly frequented by the population. Those calling the study office to express an interest in participation were screened by telephone and informed that the purpose of the study was to better understand behaviors of YMSM such as drug use and sexual behaviors. Upon completion of the survey component of the study, selected YMSM were invited to participate in an in-depth interview. To maintain an approximate balance in the sample composition across different variables, 25 interview participants were purposefully selected based on their age, race/ethnicity, HIV status, and their responses on prescription drug misuse questions (i.e. quantity, access, alternative methods of use, etc.). Interviews were conducted by the first author/doctoral candidate in private offices at the Drexel University School of Public Health.

In-depth, semi-structured interviews (Johnson, 2002) were conducted using an interview guide with open-ended questions, follow-up questions, and probes (Rubin, & Rubin, 2005). The semi-structured instrument consisted of four interview modules: substance use (i.e. history, motives and reasons for drug use, attitudes, context and settings surrounding

drug use, alternative modes of administration, different combinations, and outcomes of drug experience effects), sexual risk behaviors, experiences of discrimination and traumatic life experiences, and social context of YMSM lives (social settings, norms, and support). Some of the questions and probes used to assess motives for prescription drug misuse in this analysis included the following: “Which prescription drug do you use most frequently? What do you like about that drug? What are some of reasons you used these drugs? Have you used any of prescription drugs before having sex?” In addition, interview participants were asked to provide a detailed account of episodes when they had used prescription drugs within the last 6 months, including the context of and reasons for use. Interviews lasted from 60 to 90 minutes and were audio-recorded. Each participant received $25 cash compensation. The Drexel University’s Institutional Review Board approved the study protocol and instruments.

2.2. Data Analysis

Survey data from the quantitative part of the study were used to provide a more comprehensive portrait of occurring themes, as well as to support qualitative results, and are integrated with the interview findings below. Descriptive analyses were conducted using the SPSS 20.0 statistical software.

All interviews were transcribed verbatim by a hired research assistant and imported in Atlas.ti, a qualitative data analysis computer software program. Given the exploratory nature of this study, data analysis was shaped by a grounded theory approach (Glaser, & Strauss, 1967; Charmaz, 2000; Charmaz, 2003). Analysis was approached with a beginning awareness of the literature, which served as a tentative point of origin for initial coding. After initial review of transcripts, we used a system of free coding to develop categories of concepts and consistent themes emerging from the data. We developed sets of primary codes

of interest such as “opioid - motivations”, or “opioid - context”. From these preliminary findings, we used axial-coding to identify, confirm, and focus emerging inferences from the data (Corbin, & Strauss 2008). Using previously identified coding procedures, we reconstructed codes (filling in), expanded on code definitions (extending), collapsed or combined codes (bridging), and added new codes to the list (surfacing). Selective coding and memoing were also pursued to further define and interrogate categories. Emergent themes were labeled during axial-coding, such as “to have a good time”, “to facilitate sexual experience”, or “to get away from problems”. This process continued until all relevant themes were identified. In addition to overall data coding, a profile of each participant was developed that summarized demographic characteristics and findings related to primary participants. This approach was chosen for its proven ability to explain social phenomenon from the perspective of the participant. In the results that follow, pseudonyms are used to identify participants.

3. Results

3.1. Sample Demographics and Drug Use Characteristics

Socio-demographics of the sample are presented in Table 1. The sample had a median age of 23 (Interquartile range, IQR: 21, 26). The majority of participants were non-white (60%) and self-identified as gay/homosexual (68%). Over half of the participants were employed at least part-time (56%), with one quarter currently in school, and one quarter having more than a high school diploma. Close to half of the sample (48%) reported being ever diagnosed with sexually transmitted infection (i.e. gonorrhea, chlamydia, syphilis, herpes simplex virus, human papilloma virus), while six participants (24%) reported being HIV-positive.

Opioids and tranquilizers were the most commonly misused prescription pills in the past six months (88% and 84% respectively), followed by stimulants (68%). Polydrug misuse, defined as misuse of more than one class of prescription drugs, though not necessarily using them at the same time (Medina, & Shear, 2007), was fairly common, with 92% of participants misusing at least 2 classes of prescription drugs, and 48% misusing all three classes of prescription drugs in the past 6 months. Nearly all participants had used marijuana (96%), 48% cocaine, 40% ecstasy, 28% crystal methamphetamine, and 14% used heroin in the past 6 months. Eight participants (32%) reported using pain pills before having sex, seven of which reported not using condoms consistently in the past 6 months. Nine participants (36%) reported using tranquilizers before sex in the past six months, four of which reported not using condoms consistently in the past 6 months. Seven participants (28%) reported using stimulants before sex, all of which reported inconsistent use of condoms in the last 6 months. Marijuana was the most commonly used illicit drug before having sex (80%), followed by other illicit drugs (32% ecstasy, 24% cocaine and crystal methamphetamine).

3.2. Motives for prescription drug misuse

In our analysis, we highlight a number of motives for prescription drug misuse that are specific to YMSM. We present our findings as distinctive themes and use specific examples of each drug class within each theme. Categories below illustrate the major motives for prescription drugs misuse derived from our data and point to some specific patterns. Within each motivation category, we emphasize occurrences of polydrug use.

Table 1: Sample socio-demographics and drug behaviors in the past 6 months

Demographics	N (%)
Age, years (median, IQR)	23 (21, 26)
Race	
White	10 (40)
Non-White	15 (60)
Sexual Identity	
Gay/Homosexual	17 (68)
Bisexual/Heterosexual/Other	8 (32)
Currently in school	6 (24)
Currently employed	11 (44)
Unstable housing	8 (32)
Engaged in sex work	5 (20)
HIV +	6 (24)
Ever Diagnosed with STI	12 (48)
Prescription (Rx) Drug Misuse	
Rx Pain pills	22 (88)
# of Pain pills used (median; IQR)	(36; 6, 117)
Used Rx Pain Pills Before Sex	8 (32)
Rx Tranquilizers	21 (84)
# of Tranqs used (median; IQR)	(46; 5, 130)
Used Rx Tranquilizers Before Sex	9 (36)
Rx Stimulants	17 (68)
# of Stimulants used (median; IQR)	(6; 0, 62)
Used Rx Stimulants Before Sex	7 (28)
Illicit Drug Use	
Marijuana	24 (96)
Used Marijuana Before Sex	20 (80)
Ecstasy	10 (40)
Used Ecstasy Before Sex	8 (32)
Cocaine	12 (48)
Used Cocaine Before Sex	6 (24)
Crystal Meth	7 (28)
Used Crystal Meth Before Sex	6 (24)
Heroin	4 (16)
Used Heroin before Sex	4 (16)

3.2.1. Social/Recreational misuse

One pattern that emerged involved social and/or recreational misuse. For example, some participants described taking prescription opioids "for fun", “out of boredom”, and as a part of desire to explore and experiment. Such motives often arose in the presence of their friends, as described by this college student, who took Percocet:

> *"I was just feeling like taking it, I was just kind of bored. I was with my friends, and we just decided to do that." (1096)*

However, more often narratives centered at social activities (i.e. going out, clubbing), and emphasized social interchange. The narratives were often structured around the timing of the night out and centered on participants' experiences at social venues. Motivations included intent to use for social benefits, such as reducing anxiety when around other gay men. These drugs allowed participants to overcome social inhibitions when interacting with other men, allowing them to feel more confident and accepted in gay nightlife venues, and among their peers. The social aspect of tranquilizer misuse became apparent when participant's discussions centered on descriptions of a night out:

> *"Last Saturday, I took two blues (**Xanax, 1mg**), when I was at my house, then we went out. It did make it more fun and more exciting. We took a lot of pictures that night. I was in my own little zone, I was in my own little world. I felt powerful. They really get you like that, Xanis. It's all about me, I just felt like I was a boss, I wasn't so shy, I wasn't so timid...I was more bold. Like I almost felt like the incredible hulk a little bit, you know?" (1034)*

Some participants described the calculated, deliberate misuse of prescription pills as either an attempt to substitute a night of alcohol consumption, or as a mean of achieving a level of soberness that will allow him to continue with dancing in a club. This participant implies that taking Percocet might have reduced his alcohol consumption for a night, which made economical sense for him:

> *"Instead of going out and drinking, I'll just take a Percocet, and then I don't have to buy drinks, 'cause I take a Percocet, which my insurance paid for, and I've saved myself from a night of drinking." (2042)*

Another participant used the stimulant to reduce alcohol intoxication. This narrative centered on using prescription drugs to "party", within the contexts of parties and dance clubs, as an aid to staying up and awake well into the night:

> *"I'll take Adderall mainly when I go to the clubs. At nighttime when I'm too drunk, I'll take the Adderall to straighten me up a little bit, open my eyes, be more attentive. So, I'm always, feeling like I've got energy, I can go forever without stopping." (1108)*

A few participants described use of prescription tranquilizers to reduce the negative effect of coming down from "club/party" drugs, or prescription stimulants. These users take drugs in sequences so as to induce certain responses at specific points over the course of an evening. These motivations for prescription drug misuse were framed in the context of polydrug misuse, and were fairly common. For example, this participant used tranquilizers as a help to sleep after a night of club partying:

> *"I usually take Seroquel to go to sleep. A lot of times, I take it because I party, party meaning I do a lot of cocaine and crystal meth, those types of party drugs. When I party, I can't go to sleep, so Seroquel helps me go to sleep. I've never taken them for any other reason, except to go to sleep. I go to sleep really quick on those thing, they work really good." (1145)*

Another participant used Klonapin to help alleviate the come down from Adderall:

> *"If I've been up for a few days on the Adderall, usually I can fall asleep 'cause I'm exhausted, but if it's just one day of it, if I can find a Xanax or something, I'll come down on that." (2033)*

The above accounts, which describe using of tranquilizers to come down from stimulants, contrast with previous descriptions of tranquilizer misuse whereby a participant used Xanax to enhance his confidence in social situations.

3.2.2. Facilitating sexual interactions with other men

A second pattern of prescription drug misuse motivations included use of prescription pills within a sexual context. While a majority of participants suggested that the link between prescription pills and sexual behaviors was often “coincidental”, a number of participants reported using them intentionally, with the purpose of facilitating sexual interactions with other men. For example, it was common for those who engaged in receptive anal intercourse

to take pain pills or muscle relaxants to manage the pain associated with receptive anal intercourse, thus allowing them to be penetrated more easily during anal sex. This participant intimates the physical pain associated with receptive anal intercourse as well as how Percocets relax him psychologically before sex:

> *"I like men, so it's kind of hard for me to talk to somebody without them tryin' to put their dick in my ass...and that's a lot of stress, anxiety, and then pain. I might take two Percocets, make sure I'm high, because I know this guy is wanna try to fuck me. So it helps me to get over that pain, and stress about him."(1022)*

Similarly, another participant reported that Xanax made receptive anal intercourse easier:

> *"I do Xanax sometimes before, it's...it's just easier sometimes to receive anal sex." (1093)*

Those who engaged in insertive anal intercourse described taking an opioid pill to increase their sexual excitation and to prolong sexual experience. A number of participants noted that taking opioids allows them to have erection for extended period of time ("oxyboner"), but noted their inability to ejaculate while on opioids. This participant described how he wanted his sexual encounters to last longer by postponing ejaculation:

> "*Sometimes I'll nut [ejaculate] kind of quick. But when I'm on oxy, it's takin' me longer to nut, because it's feelin' good, and I want it to keep feelin' good...I don't want it to hurry up." (1034)*

Contrary to his experience with opioids, the same participant reported that he was unable to keep erection when he took Xanax:

> *"My dick really couldn't get hard when I took the Xanax. I mean it was soft a little bit. When you take the Percs, your dick get hard, like brick, but with the Xanis, it was just soft again...it was just like 'Oh, man, I don't think I can take these and be fucking'." (1034)*

For some participants, especially those who struggled with their sexuality, or were sex workers, tranquilizers helped to facilitate sex with other men. This 21-year-old self-identified heterosexual man reports:

> *"The majority of the sex that I had with males was for money, to support my (drug) habit. I would take the Xanax because I wouldn't really think; it wouldn't really bother me as much when I had sexual relations with them as if I was sober." (1104).*

A very few participants reported engagement in sexual activities as one of motivations for stimulant misuse. For example this participant, when asked whether sex was a motive for misuse of Adderall, describes it:

> *"Not really, maybe Adderall, just because I thought it might help, make me want to. It makes me hypersexual, it'll make me think about sex more often. Maybe partake in activities I shouldn't. Promiscuity in general, public sex, or...I'll seek it out, I'll go on Grindr or Craigslist, or more inclined to look at pornography, when on Adderall." (2033)*

This participant notes that Adderall causes him to make decisions he should not be making, creating a rationale that Adderall is the cause of his behavior. While some of the effects of stimulants when taken in a sexual context were described as achieving "longevity", or "aggressiveness", a majority of participants described the relationship between prescription stimulants and hooking up with men as more coincidental rather than intentional:

> *"If I'm at a party, sometimes, that'll happen. But I don't use Adderall to hook up with anyone. If I'm at a party, I'm drunk or I'm messed up on Addys, and then I end up hooking with someone, but I don't go through the night planning to hook up with anyone." (1179)*

Participants who reported taking EDD appeared to use them to enhance and extend their sexual experiences. For instance, one participant who engaged in sex work reported that EDD helped with stamina, while another who used crystal methamphetamine reported use of EDD to counter the effect of it, i.e. "meth dick":

> *"I take like, uh, Viagra, and the other one, Cialis. And that helps me keep it up, when I'm on Tina." (1045)*

It is important to note that when asked whether they felt that prescription drug misuse contributed to high-risk sexual behaviors (i.e. UAI), only a few participants thought of

prescription pills as something that might put them at risk. In many of these occasions, prescription drug misuse was accompanied by other substance use, in particular alcohol and marijuana. This participant described one such recent occasion when he engaged in UAI:

> *"I smoked weed, took like three Percocets, and I was drinking. It absolutely impaired my judgment. Absolutely, because I had no care in the world. I was very careless in what I did, and my actions, so like, you know that could have been a life sentence for me."(1108)*

3.2.3. Psychological motives, i.e. stress management, coping with negative affect, energizing

Another commonly cited motive for misuse of prescription drugs, in particular prescription opioids and tranquilizers, focused on psychological motives. Responses within this category consistently focused on self-medicating for problems, such as depression, trauma, grief, loneliness, relationships, and stress related to personal life. Participants often emphasized the stressful environment and the need to cope, escape, or to avoid and regulate unpleasant emotions. Prescription opioids and tranquilizers often represented an opportunity to escape the reality of everyday hardships, and to relieve stress related to their work or personal life. The need to escape from life stresses was made explicit by this participant when asked of motives for prescription opioid misuse:

> *"For fun, to get high, but also to escape. You know, when things get too heavy sometimes, it's just easier to pop a pill than it is to, figure it out, especially when you are under duress. The last six months has really been difficult for me, because I lost my job, I got into my first relationship, I subsequently moved several states away from my family. All those things together, just created a circumstance for me where it was easier, in some instances, to escape through taking a pain medication." (1119)*

About one-third of participants were homeless. For participants experiencing homelessness (one-third of our sample), prescription drugs offered an escape route to cope with their daily

struggles. This homeless participant described taking Xanax as the only way he was able to cope with adversity:

> "*That's the only way that I'm able to come out. Do you think I would be able to come out here, in this cold, in this rain? No, no! With being homeless and trying to go to my grandma's house, and all the hell that's going on there, there's no way I could do it without a Xanax to calm my anxiety. There's just no way." (1022)*

Another participant endorsed feeling of depression and stress related to financial issues as motivation for taking Klonapin. This was a way to escape his daily reality:

> *"I was depressed. I've been having a lot of money issues lately; it kind of affects everything in my life. That's probably why. It's sort of like a temporary relaxed feeling, even for a few hours or a day, or a night. It allows me to go to sleep and not think about problems that I have."(1053)*

In several narratives participants elaborated on significant adverse events that happened either long time ago, or more recently in their lives. For example, almost half of sample (48%) has suffered sexual abuse in their childhood. One participant connected his current misuse to the memories of sexual abuse in their childhood.

> *"The reason why I take a lot of pills now is because of the pain, I want to forget that pain. If that pain keeps in my head, I try to take as many pills as I can to forget the pain. One time I popped six Percs and I passed out."* (1008)

Another participant gives a more recent example of adversity in his life and how managing this situation justified taking tranquilizers:

> *"I was going through a lot of stress. My brother attempted suicide a month before and my whole family was a complete mess from it. That and also having monetary stress, and I got into a little bit of trouble with the law. It's the only time I've taken a medication, to not have fun, but to bring myself up, actually." (1179)*

Nearly one quarter of participants reported being HIV positive. One participant, who discovered the previous week that he seroconverted described, how he used Klonapin to cope with mental health ramification of being diagnosed with HIV:

> *It was a rough day. Friday and Saturday both were kind of anxious. I had found out that I...had a health issue, and infected somebody else with it, one of my good friends. Seeing the reaction on them, I kind of saw my own reaction, and I guess that's when it fully hit me, in a way. I was hiding the pain of that, and I drank, took Klonapins from my friend who I was with, who was prescribed to them. The whole two days were kind of like self-loathing. Not like it was my fault, but we both were just dumb, and careless in a way...it was just very sad." (1122)*

Contrary to above motives for opioids and tranquilizers, motives that pertained to stimulants emphasized a need to feel more energized. Polydrug use emerged in narratives explaining motivations for stimulant misuse, as explained by this participant who used Adderall in conjunction with crystal methamphetamine when he felt irritable or tired:

> *"I kind of like to ride like a stimulant wave, it's very typical for me to after doing crystal all weekend to just do Adderall, to get through the day. Because, again, you're not kind of cranky, you're still up and you're still awake, and you're not tired, and you're able to do super-human things by just keeping going"* (1043)

4. Discussion

To our knowledge, this is one of the first studies to capture in-depth information on the constructs that are linked to motives for prescription drug misuse among YMSM population. Thematic analysis of qualitative data revealed that motivations for prescription drug misuse could be organized around three general themes: social/recreational, sexual and psychological. Social/recreational motives were often reported by individuals wishing to achieve altered states of consciousness and experiment with particular drugs. For example, a number of participants endorsed "to get high," and "to have fun" as motives for prescription opioid misuse. These motivations often emerged in the presence of friends. Misuse of prescription opioids was also associated with a higher likelihood of using opioid medications to supplement, or replace the effects of other drugs, i.e. alcohol. Complimenting the findings of the previous research on tranquilizer misuse in the club scene (Kurtz, et al., 2011), YMSM in this study who attend nightlife venues misused tranquilizers regularly. Tranquilizer misuse

in our participants' accounts was seen as enhancing sociability and facilitating interactions within the gay scene. This process may be valid for both those who are high in sensation-seeking and for those with negative self-images, who may engage in tranquilizer misuse in response to social anxiety (Kalichman, et al., 1994). Another facet of tranquilizer misuse was use in the context of coming down from club drugs and stimulants they used while engaged in a club scene. These findings are not surprising given the high multidrug use within club scene (Inciardi, et al. 2007; Kurtz, et al., 2011). A number of YMSM misused prescription pills in such settings for purposes of "partying". In these narratives use of stimulants was about fun and sociability, often described as a positive experience. These participants described stimulant misuse in association with, or as substitution for illicit drugs (i.e. cocaine and methamphetamine). Furthermore, a number of participants in our study reported simultaneous use of prescription pills and alcohol, which is problematic as the previous research shows that the use of psychoactive medication in combination with alcohol can lead to both acute and long-term risks (Wilsnack, et al., 2004).

Previous research has found that some prescription drugs such as erectile dysfunction drugs have become a stable fixture of the sexual culture of gay men (Paul, et al., 2005; Purcell, et al., 2005). With this study we further contribute to the body of literature by finding that YMSM misuse other prescription drugs for sexual enhancement as well. Misuse of prescription drugs for sexual reasons was both planned and spontaneous. Approximately one third of participants reported using prescription pills before sex. In some occasions there is an explicit planning to use prescription drugs (mainly opioids and tranquilizers) for the purposes of engaging sexually with other men and maximizing sexual pleasure. A number of participants found that prescription opioids negatively affect their desire to have sex similar

to previous study of opioid users (Johnson, et al., 2013), yet some of participants used them to ease the pain associated with receptive anal sex. Participants who have a strong negative affect may be using these drugs strategically in order to become less mindful of the stress or anxiety related to sexual contact with other men. This might be particularly true for those who are struggling with their sexuality. In other occasions there is unplanned, spontaneous or coincidental use of these drugs as related to sex. For these participants, prescription drug misuse was connected to other issues, including sociability, rather than sexual behaviors, and it was viewed as acceptable within this context. This supports similar findings by Fazio et al., (2012) on cocaine use by MSM, as well as suggestion that some YMSM use drugs to replace intercourse (Ross, & Williams, 2001). Prescription drug misuse was often combined with use of alcohol and other, illicit drugs, making the relationship of prescription drug misuse and HIV-risk behaviors, such as UAI, less clear. This relationship may be after all a consequence of high prevalence of UAI in this population.

Not surprisingly, pain pill and tranquilizer misuse was also associated with depression, anxiety and overall mental stress. Often, motivations for opioid and tranquilizer misuse evoked a strong need for emotional escape. Similar to club drugs (McKirnan, et al., 2001; Jerome, Halkitis, & Siconolfi, 2009) these drugs may help to raise self-esteem, confidence, or feeling of attractiveness, thereby helping YMSM to deal with HIV status, stigma, or discrimination. For some participants in our study, these pills offered an escape route for dealing with major stressors in their lives, including traumatic experiences that happened in a distant or more recent past. YMSM with abuse and discrimination histories may be particularly drawn to the escapism by self-medicating themselves with prescription opioids and tranquilizers. Prescription opioids and tranquilizers, in particular, may have an

additional appeal as a mean of self-medication due to their perceived safety, known dose dependent response, and psychopharmacological properties (Cicero et al., 2005; Friedman, 2006, Quintero, 2009, Zulig, & Divin, 2012). Given these findings, support to aid these YMSM to cope with their traumatic experiences appears to be particularly warranted.

While not a focus of this analysis or emphasized in our findings, we found that pain relief was a frequently cited motive for opioid misuse, which supports previous findings that not all misuse is for the purposes of intoxication (McCabe, et al., 2005). We also observed a relationship between prescription stimulants misuse and improving concentration and attention for study purposes (Teter, et al., 2005; Prudhomme-White, et al., 2006; McCabe, et al., 2006). These motives for misuse of prescription pain pills and stimulants, which have been well-described in prior studies (Quintero, et al., 2006; Quintero, 2009; Boyd et al., 2006; McCabe Cranford, et al., 2007), making our sample similar to non-YMSM populations in some ways.

While not a representative sample, these findings suggest that substance use prevention programs aimed at YMSM should include content on prescription drug misuse as well. From a public health and treatment perspective, our findings indicate the need to consider underlying motives for prescription drug misuse among YMSM. These motives vary by both individual motivations, and also by different types of prescription drugs. The data presented in this study could help clinicians to develop deeper understanding of motives for prescription drug misuse. Understanding YMSM's intrinsic motivations to these behaviors is likely to improve treatment options and ultimately health outcomes for these young men. Furthermore, clinicians working with YMSM who are misusing prescription drugs should routinely inquire about their motives, as this might indicate exposure to

significant adverse events in YMSM's lives. While misuse of prescription drugs is problematic from a public health perspective, prevention approaches programs should target broader problems such as childhood abuse, discrimination, mental health, homelessness, and unemployment. Interventions addressing prescription drug misuse among YMSM should place an emphasis on motivations presented here, as such interventions are most likely to affect significant and lasting behavior change.

The current study is subject to several important methodological limitations. All data are based on self-report, and may be subject to recall bias since the events reported often occurred several months prior to being interviewed (i.e. details of particular experience related to misuse of prescription drugs). There is also a possibility that participants felt compelled to offer socially desirable responses. However, all interviews were conducted in private offices, and after conducting quantitative survey, at which point participants were more comfortable with the interviewer. The enrollment criteria were designed to capture YMSM who are current misusers of prescription drugs, thus, our findings cannot be generalized to larger sample of high-risk youth, or YMSM in general. Furthermore, we targeted a small segment of YMSM, and the sample was not selected randomly, hence the findings do not offer a greater deal of external validity. However, our analyses indicated that we reached saturation with regard to emerged themes. In addition, these findings reveal an interesting narrative about a group of YMSM who may be particularly vulnerable to adverse health outcomes. Lastly, all data collection was completed prior to analysis, which limited the ability to explore emergent themes as they arose during real time (Patton, 1990).

In conclusions, YMSM in our study reported multiple motives for prescription drug misuse, including facilitating sexual interactions with other MSM, adding to the

multidimensional nature of prescription drug misuse etiology (Rigg, & Ibanez, 2011). These findings indicate the complexity of prescription drug misuse in lives of YMSM. Our study points to the importance of recognizing and addressing motives for prescription drug misuse, as it likely is result of a range of psychosocial problems impacting YMSM. Furthermore, prescription drug misuse is likely to have an impact on illicit drug use and other health behaviors, including sexual risk behaviors, in this population. Future research in this population should examine the intersection of prescription and illicit substance use and their meanings. Through a further understanding of these interactions, potential individual and public health harms associated with prescription drug misuse may be reduced among YMSM.

Chapter 5. Summary and Implications

Summary

Prescription drug misuse has emerged as a significant public health problem over the last decade, particularly among young adults. The prevalence of prescription drug misuse among young adults (ages 18-29) in the U.S. has risen considerably in recent years (Compton, & Volkow, 2006). The majority of studies on prescription drug misuse among young adults have focused on college populations. Although YMSM continue to be at elevated risk for substance use, little research has investigated prescription drug misuse among YMSM. Given an increase in HIV incidence among YMSM in recent years, and the well-established connection between substance use and HIV risk behavior, it is important to examine the relationship between prescription drug misuse and sexual risk behaviors. The current study sought to understand this relationship. The study also investigated a set of risk factors, such as childhood abuse, experiences of discrimination, and mental health distress, and their contribution to prescription drug misuse and sexual risk behaviors. In addition, this research sought to examine motivations and context that shapes YMSM's prescription drug misuse and may provide a more complete understanding of risk behaviors. Understanding YMSM's motivations for prescription drug misuse may also prove important for prevention efforts among young adults.

Chapter 2 described a quantitative analysis in which we measured associations of prescription drugs misuse (opioids, tranquilizers, stimulants, and "other" prescription pills) with engagement in sexual risk behaviors (i.e. UAI, and increased number of sex partners). Rates of prescription drug misuse, in particular of opioids and tranquilizers, in our study sample were higher than that of any illicit drug (including marijuana). Our participants also

reported a high rate of UAI, and high number of sex partners. We investigated associations between sexual risk behaviors, socio-demographic, and drug use variables in two distinct regression models: bivariate logistic models for UAI and zero-truncated Poisson regression model for number of sex partners. After adjusting for socio-demographic variables and illicit drug use, a number of prescription drug classes were either significantly, or marginally associated with UAI. There was a significant effect of misusing prescription opioids, muscle relaxants, and over-the-counter (OTC) medications on engaging in UAI, in particular receptive UAI. Misuse of prescription tranquilizers before sex was protective to engaging in UAI, and in particular, insertive UAI. No prescription drug class was associated with higher number of sex partners after adjusting for socio-demographic variables and illicit drug use.

Chapter 3 summarized findings from analysis on associations of individual and psychosocial factors with higher levels of prescription drug misuse, UAI, and higher number of sex partners in our sample. The analysis was based on a conceptual model indicating that YMSM's substance abuse and sexual risk behaviors are a part of the behavioral system that interacts with both personality and the environment. First, it was hypothesized that the YMSM who report high levels of childhood adverse experiences and/or social discrimination would report increased levels of mental health distress, i.e. depressive, anxiety, somatization and stress symptoms. In a bivariate analysis, we observed strong associations between high levels of childhood abuse and discrimination, and mental health stress. Second, I hypothesized that YMSM who report higher levels of stressors would report higher substance use and/or increased sexual risk behaviors. In multivariable models, childhood abuse was associated with increased prescription opioid and tranquilizer misuse. Additionally, high level of stress was associated with increased prescription opioids misuse,

while high level of somatization was associated with illicit drug use. Experiences of racism among racial minority participants were significantly associated with reduced misuse of prescription tranquilizers. However, the strongest predictors of increased prescription drug misuse were age and bisexual/heterosexual identification for opioids and tranquilizers, while being White was the strongest predictor for increased misuse of stimulants. Older age was also associated with UAI, while being White was also strongly associated with illicit drug use and UAI. Third, I examined prescription drug misuse and illicit drug use as mediators of the relationship between risk factors and sexual risk behaviors. Analyses indicated that illicit drug use, but not prescription opioids, significantly mediate the impact of stressors on having a high number of sex partners. While not as robust as expected, these findings, nonetheless, indicate a link between contextual risk factors and adverse behaviors in this population. In particular, YMSM who are exposed to childhood abuse may be at increased risk for high levels of prescription opioid and tranquilizer misuse later in life as a means of avoidance or alleviation of distress from earlier victimization. In addition, while the findings counter our hypothesis on associations of stressors and sexual risk behaviors, it is possible that the multiplicity of stressors indicates greater sexual risk behaviors (Stall, Mills, Williamson, et al., 2003; Parsons, Grov, & Golub, 2012; Mustanski, et al., 2007). Comprehensive prevention aimed at YMSM risk behaviors should consider the multiplicity of risk factors at the individual, relational, community and societal levels.

Chapter 4 described the results from the qualitative part of the study, which collected in-depth narratives from YMSM who had recently misused prescription drugs. In this analysis, participants described their motivations for prescription drug misuse. While we found a considerable overlap with previous studies among young adults and their motives for

misuse of prescription drugs, our data yielded some distinct motivations specific for YMSM. The most commonly cited motives for misuse of prescription drugs included social/recreational motives, facilitating sex with other men, and psychological motives such as stress management or escapism from everyday hardships (prescription opioids and tranquilizers) or feeling more energized (prescription stimulants). Notably, in our sample, prescription opioids and tranquilizers offered an escape route for dealing with major stressors in YMSM lives, while prescription stimulants often offered an opportunity to enhance social cognition. Misuse of prescription drugs for sexual purposes was both intentional and spontaneous. Our narratives indicated a clear intention of YMSM to misuse prescription drugs to engage in receptive or insertive intercourse, or to feel a closer connection to their sexual partners. However, often it was difficult to disentangle whether prescription drug misuse is related to sexual risk behaviors (UAI, or increased number of partners). This misuse was combined with alcohol and illicit drug use, often in a single episode, which revealed complex patterns of polydrug use and further complicated this relationship. However, our findings offer insights in YMSM's motivations for prescription drug misuse, supporting the need for developing prevention messages specific to prescription drug misuse among YMSM.

The strength of the current study includes its mixed methods design, in which quantitative and qualitative recruitment were conducted concurrently. During participants' quantitative interview, I focused on capturing responses to key questions, which immediately identified the respondent as a potential qualitative participant. The study's quantitative findings provided more generalizable and objective understanding of prescription drug misuse phenomena and its relationship to sexual risk behaviors. This relationship between

was both complex and multidimensional. For many YMSM in our study, stressors such as abuse, discrimination and harassment were continuous throughout the life cycle. These experiences might have been important factors contributing to exhibited high levels of psychosocial distress. Taken together, these factors contributed to high prescription drug misuse and high overall substance use in our sample, which was consistent with the theoretical underpinnings of the study. The qualitative research provides a rich narrative and detailed insider's perspective on YMSM's motivations for prescription drug misuse. This was critical to understanding study's quantitative findings. For example, from the quantitative responses it was understood that some participants misuse prescription opioids as response to stressful life events. Qualitative answers provided detailed insight and a context for the relationship between these risk factors and prescription opioid misuse. Taken together, the three analyses presented here, provide important insights into the complex dynamics of risk behaviors, in particular substance use and sexual risk behaviors in YMSM. Our findings suggest that prescription drug misuse is an additional health burden for this population.

Limitations

The overall findings should be considered in light of some limitations. We sampled YMSM population from a single mid-Atlantic city potentially limiting the generalizability of the study findings to the other parts of the country. This is a convenience sample based on the strict enrollment criteria designed to capture YMSM who were current misusers of prescription drugs. Hence, these findings may be more applicable to high-risk YMSM than to the general population of YMSM. In addition, a significant number of YMSM we approached to be a part of this study do not engage in prescription drug misuse or substance

use in general. The cross-sectional nature of this study precludes conclusions about causality or direction of influence. Only longitudinal studies can provide conclusive evidence about causality, however such study design was beyond the scope of the current study. Threats to the validity of study findings due to recall bias, or socially desirable reporting are possible, although steps were taken to minimize such effects. Data was collected in a private office or in secluded public spaces, with help of cue cards minimizing social desirability, particularly around sensitive topics such as substance use or sexual behaviors. Questions about risk behaviors were limited to the past 6 months in order to help minimize recall bias. It should also be mentioned that analysis of additional data has been limited due to time constraints. However, focusing on a limited number of constructs ensured a more efficient data analysis that allowed for more timely completion of dissertation. Despite above limitations, the findings presented here can provide preliminary evidence to inform future analysis and research.

Implications

The results from this study fill a gap in the YMSM and HIV literature on prescription drug misuse and its relationship to sexual risk behavior. Findings could inform physicians, community members, public health practitioners, researchers, and policy makers of the following: (1) there is a relationship between prescription drug misuse and sexual risk practices (e.g. UAI) among young YMSM; (2) there are specific risk factors that contribute to increased prescription drug misuse and/or sexual risk behaviors among YMSM; (3) some motivations for prescription drug misuse are unique for YMSM.

Study findings have the potential to guide the public health community and practitioners towards devising strategies and policies that will prevent the negative effects of

prescription drug misuse on YMSM. Current prescription drug misuse prevention strategies and interventions include attempts to educate the general public with media campaigns, or to provide education to healthcare providers and pharmacists ensuring safe dosages prescribing practices (Community Anti-Drug Coalitions of America, CADCA, 2010). More recently, we have seen the establishment of prescription drug monitoring programs (Levi, Segal, Fuchs Miller, et al., 2013). These strategies are often designed and applied to the whole population of young people, and without additional attention being paid to prescription drug control measures aimed at YMSM. These traditional programs do not address underlying factors contributing to prescription drug misuse and may not be as effective for groups such as YMSM. Programs aimed at YMSM should include outreach and social service programs and aim at both individual and group interventions. The study data suggests the importance of developing counseling programs or behavioral interventions that seek to reduce prescription drug misuse and sexual risk behaviors in this population. While most of prevention programs are implemented when risk behaviors have already been initiated, our findings suggest that intervening in early to mid-childhood may be appropriate if we are to reduce later risk behaviors. Further, structural interventions that affect the risk environment could decrease risk behaviors in YMSM. For those who are already exposed to risk behaviors, providing supportive services that address stress reduction and mental health are imperative. Given findings from our study, the most promising approaches will be those that target multiple underlying risk factors (Naar-King, Wright, & Parsons, 2006), reflecting the multi-faceted nature of risk behaviors. While no single intervention is best for all YMSM, study findings should be taken into account when formulating substance use and HIV prevention messages targeted at YMSM. To be effective, intervention approaches must take in account the

contextual, relational, and interpersonal components of YMSM. These interventions need to be relevant to the targeted population (i.e., consistent with norms, motivations, and beliefs), and they must include members of the community (i.e. LGBT organizations such as the Mazzoni Center) in program planning and implementation. Research-community collaboration is important tool for development of these intervention programs for YMSM.

Research on drug abuse among YMSM has a rich history. By utilizing both quantitative and qualitative methods, this study contributes to further understanding of this phenomenon. This study provides a unique perspective into different aspects of substance use among YMSM that is absent from the literature. This is particularly important given the rates of HIV infections among YMSM, and the emergence of a prescription drug misuse epidemic. Outcomes of this study present the starting point for the next stage of research. Collected data from the quantitative component of the study will seek to identify protective factors that might prevent more adverse outcomes among YMSM. Identifying strengths that YMSM exhibit, such as resilience, may yield insights towards designing interventions with increased effectiveness in reducing HIV transmission and drug abuse among YMSM. Further exploration of social networks may be warranted to explain some of current study's findings. Additional qualitative research will identify important contextual factors that may affect drug use, including access to, and norms surrounding substance use.

Finally, the conducted study is relevant to the part of Department of Health and Human Services (DHHS) mission that pertains to the implementation of a research agenda designed to advance knowledge related to understanding health disparities (DHHS, 2010). YMSM health requires specific attention from public health professionals to address a number of disparities. The importance of these issues was recognized by the DHHS when it

included both MSM as a population group experiencing health disparities in Healthy People 2020: Understanding and Improving Health of Americans (DHHS, 2010). Eliminating these health disparities may significantly contribute to health among YMSM.

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Vita

Aleksandar Kecojević was born in Tuzla, ex-Yugoslavia, is a citizen of Serbia and Canada. He earned a B.Sc. in Biology from the University of Western Ontario (1998), Canada, and MPH from Johns Hopkins Bloomberg School of Public Health (2008).

While at Drexel, he was awarded a two-year, National Institute of Drug Use (NIDA) grant (R36 DA034543) that supported his dissertation. In 2011, Kecojević was awarded the Walter J. Lear Outstanding Student Research Award at the American Public Health Association (APHA) meeting. In 2012, he was awarded Drexel University International Travel Award, to attend a French Schools of Public Health Doctoral Symposium in Paris, France. While at Drexel, he has worked on projects involving prescription drug misuse among young adults in New York City and Los Angeles, and overdose prevention among injection drug users in Los Angeles and Philadelphia. These, and previous research activities have led to co-authorship of twenty-four peer reviewed articles, including a number of first author papers. He has also presented his work at conferences including APHA and College on Problems of Drug Dependence (CPDD). In Department of Community Health and Prevention, he was teaching assistant for several courses. This dissertation was awarded Drexel University Outstanding Dissertation Award in Social Sciences.

Kecojević serves as the peer-reviewer for several leading journals in the field of addiction, including Drug and Alcohol Dependence, Addiction, and Journal of Drug Issues. He is a member of the APHA and its Lesbian, Gay, Bisexual and Transgender (LGBT) Caucus. Upon his graduation from Drexel University, Dr. Kecojević will continue his career at the San Diego State University.